FCC SAR EVALUATION REPORT

In accordance with the requirements of
FCC 47 CFR Part 2(2.1093), ANSI/IEEE C95.1-1992 and
IEEE Std 1528-2013

Product Name : AUTO Smart Diagnostic Tool

Trademark : LAUNCH

Model Name : Creader Professional 919 Expert

Family Model : N/A

Report No. : N26012902635E

FCC ID : XUJCP919EXPERT

Prepared for

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name	Launch Tech Co., Ltd.
Address	No.4012, Launch Industrial Park, North Wuhe Rd, Bantian Street, Longgang District, Shenzhen, 518129 China
Manufacturer's Name.....	Launch Tech Co., Ltd.
Address	No.4012, Launch Industrial Park, North Wuhe Rd, Bantian Street, Longgang District, Shenzhen, 518129 China

Product description

Product name	AUTO Smart Diagnostic Tool
Trademark	LAUNCH
Model Name	Creader Professional 919 Expert
Family Model	N/A
Standards	FCC 47 CFR Part 2(2.1093) ANSI/IEEE C95.1-1992 IEEE Std 1528-2013 Published RF exposure KDB procedures

This device described above has been tested by Shenzhen NTEK. In accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 and KDB 865664 D01. Testing has shown that this device is capable of compliance with localized specific absorption rate (SAR) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992. The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Test Sample Number S2605190038-1#

Date of Test

Date (s) of performance of tests ... Jun. 11, 2026 ~ Jun. 20, 2026

Date of Issue ..... July. 06, 2026

Test Result ..... **Pass**

Prepared By :	Reviewed By :	Approved By :
Owen Xiao	Aaron Cheng	Alex Li
(Project Engineer)	(Supervisor)	(Manager)

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	July. 06, 2026	Owen Xiao

TABLE OF CONTENTS

1. General Information

1.1. RF exposure limits

(A).Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

(B).Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

NOTE: ***Whole-Body SAR*** is averaged over the entire body, ***partial-body SAR*** is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. ***SAR for hands, wrists, feet and ankles*** is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

Occupational/Controlled Environments:

Are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

General Population/Uncontrolled Environments:

Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

NOTE Trunk Limit 1.6 W/kg APPLIED TO THIS EUT

1.2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Creader Professional 919 Expert are as follows.

Band	Max Reported SAR Value(W/kg)
	1-g Body (Separation distance of 0mm)
WLAN 2.4G	1.132
Bluetooth BR+EDR	0.301
WLAN 5.2G	0.684
WLAN 5.3G	0.790
WLAN 5.6G	0.463
WLAN 5.8G	0.227

Note: This device is in compliance with Specific Absorption Rate (SAR) for general population / uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 & KDB 865664 D01.

1.3. EUT Description

Device Information			
Product Name	AUTO Smart Diagnostic Tool		
Trade Name	LAUNCH		
Model Name	Creader Professional 919 Expert		
Family Model	N/A		
Model Difference	N/A.		
FCC ID	XUJCP919EXPERT		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna Type	FPC Antenna		
Battery Information	DC 7.6V, 6300mA, 47.88Wh		
Hardware version	N/A		
Software version	N/A		
Device Operating Configurations			
Supporting Mode(s)	WLAN 2.4G/5G,Bluetooth		
Test Modulation	WLAN(DSSS/OFDM), Bluetooth(GFSK, π/4-DQPSK, 8DPSK)		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	WLAN 2.4G	2412-2462	
	WLAN 5.2G	5150 ~5250	
	WLAN 5.3G	5250~5350	

	WLAN 5.6G	5470~5725
	WLAN 5.8G	5725~5850
	Bluetooth	2402-2480

Note：This device does not have a hotspot mode.

1.4. Test specification(s)

FCC 47 CFR Part 2(2.1093)
ANSI/IEEE C95.1-1992
IEEE Std 1528-2013
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
KDB 616217 D04 SAR for laptop and tablets v01r02
KDB 865664 D02 RF Exposure Reporting v01r02;
KDB 447498 D01 General RF Exposure Guidance v06;
KDB 248227 D01 802.11 Wi-Fi SAR v02r02;

1.5. Ambient Condition

Ambient temperature	20°C – 24°C
Relative Humidity	30% – 70%

1.6. Facilities And Accreditations

1.6.1. Facilities

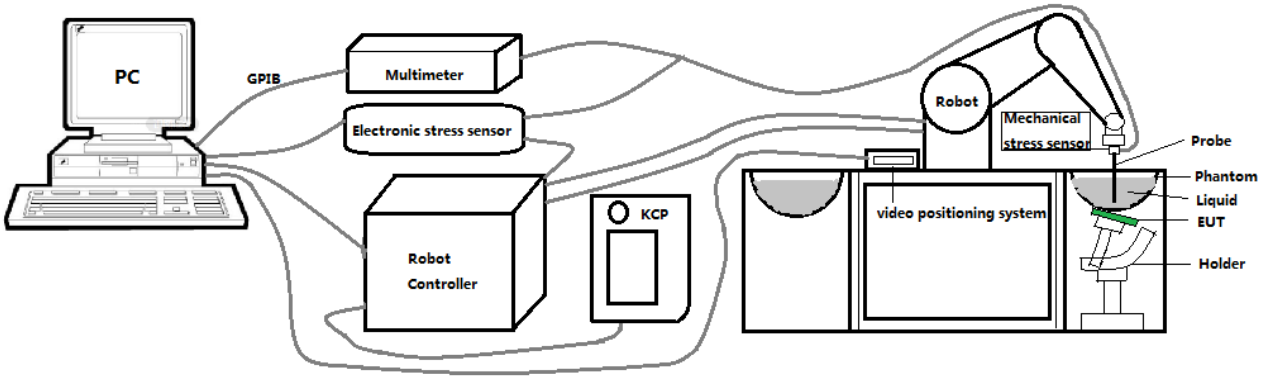
All measurement facilities used to collect the measurement data are located at
Building 1, No. 24 Xinfa East Road, Xiangshan Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China
The sites are constructed in conformance with the requirements of IEC/IEEE Std 1528-2013

1.6.2. Laboratory Accreditations And Listings

Site Description
CNAS Lab. : The Certificate Registration Number is L5516
A2LA Lab. : The Certificate Registration Number is 4298.01
FCC Accredited : Test Firm Registration Number: 463705
Designation Number: CN1184
ISED Registration : Company Number: 9270A
CAB identifier: CN0074

2. SAR Measurement System

2.1. SATIMO SAR Measurement Set-up Diagram



These measurements were performed with the automated near-field scanning system OPENSAR from SATIMO. The system is based on a high precision robot (working range: 901 mm), which positions the probes with a positional repeatability of better than ±0.03 mm. The SAR measurements were conducted with dosimetric probe (manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation.

The first step of the field measurement is the evaluation of the voltages induced on the probe by the device under test. Probe diode detectors are nonlinear. Below the diode compression point, the output voltage is proportional to the square of the applied E-field; above the diode compression point, it is linear to the applied E-field. The compression point depends on the diode, and a calibration procedure is necessary for each sensor of the probe.

The Keithley multimeter reads the voltage of each sensor and send these three values to the PC. The corresponding E field value is calculated using the probe calibration factors, which are stored in the working directory. This evaluation includes linearization of the diode characteristics. The field calculation is done separately for each sensor. Each component of the E field is displayed on the "Dipole Area Scan Interface" and the total E field is displayed on the "3D Interface"

2.2. Robot

The SATIMO SAR system uses the high precision robots from KUKA. For the 6-axis controller system, the robot controller version (KUKA) from KUKA is used. The KUKA robot series have many features that are important for our application:

- High precision (repeatability ±0.03 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

2.3. E-Field Probe

This E-field detection probe is composed of three orthogonal dipoles linked to special Schottky diodes with low detection thresholds. The probe allows the measurement of electric fields in liquids such as the one defined in the IEEE and CENELEC standards.

For the measurements the Specific Dosimetric E-Field Probe 3423-EPGO-426 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter : 2.5 mm
- Distance between probe tip and sensor center: 1 mm
- Distance between sensor center and the inner phantom surface: 2 mm (repeatability better than ±1 mm).
- Probe linearity: ±0.06 dB
- Axial isotropy: ±0.01 dB
- Hemispherical Isotropy: ±0.01 dB
- Calibration range: 650MHz to 5900MHz for head & body simulating liquid.
- Lower detection limit: 8mW/kg

Angle between probe axis (evaluation axis) and surface normal line: less than 30°.

2.3.1. E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy shall be evaluated and within ±0.25dB. The sensitivity parameters (Norm X, Norm Y, and Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv F) of the probe are tested. The calibration data can be referred to appendix D of this report.

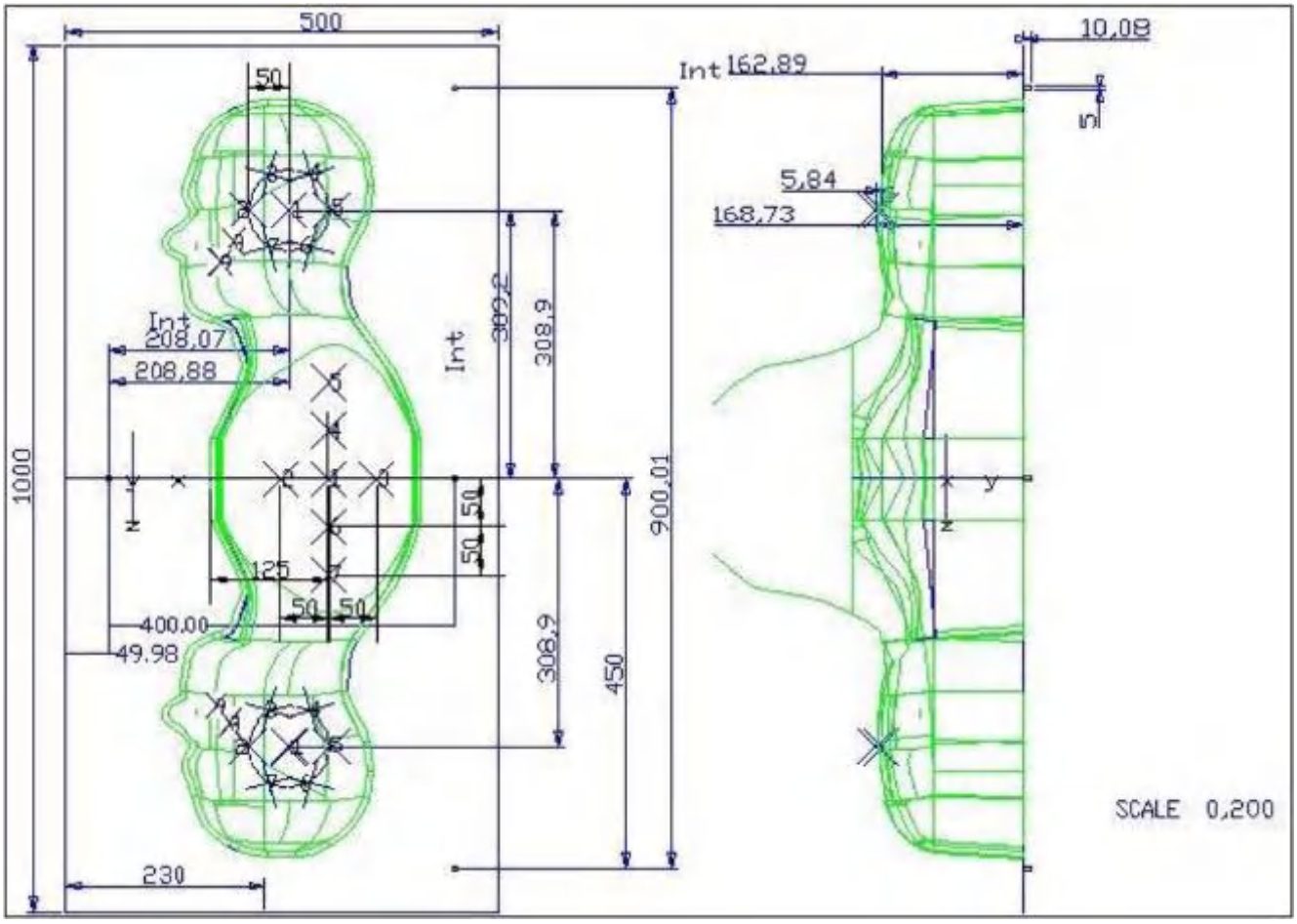
2.4. SAM phantoms

Photo of SAM phantom SN 16/15 SAM119

The SAM phantom is used to measure the SAR relative to people exposed to electro-magnetic field radiated by mobile phones.

2.4.1. Technical Data

Serial Number	Shell thickness	Filling volume	Dimensions	Positionner Material	Permittivity	Loss Tangent
SN 16/15 SAM119	2 mm ±0.2 mm	27 liters	Length:1000 mm Width:500 mm Height:200 mm	Gelcoat with fiberglass	3.4	0.02

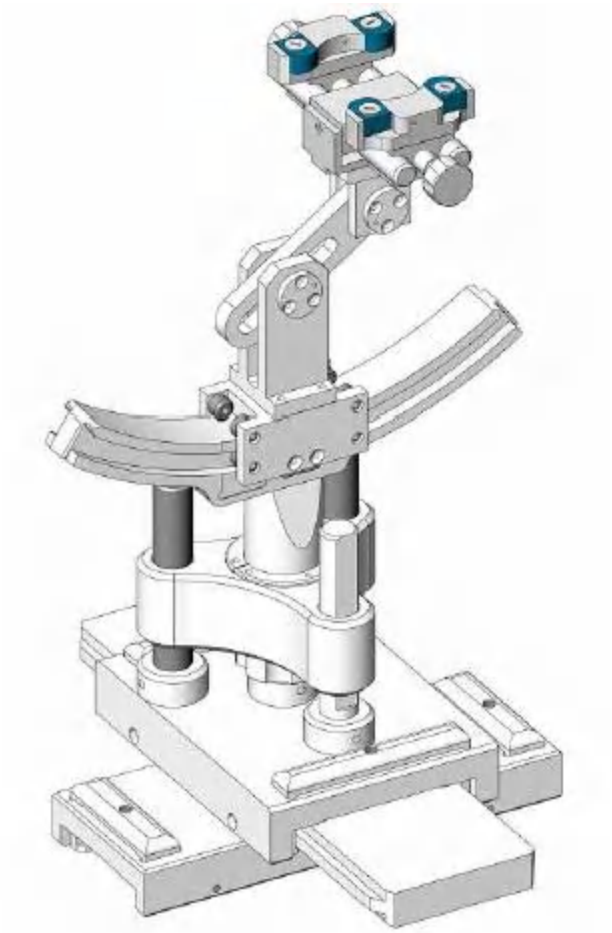


Serial Number	Left Head(mm)		Right Head(mm)		Flat Part(mm)	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

The test, based on ultrasonic system, allows measuring the thickness with an accuracy of 10 µm.

2.5. Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1 degree.



Serial Number	Holder Material	Permittivity	Loss Tangent
SN 16/15 MSH100	Delrin	3.7	0.005

2.6. Test Equipment List

This table gives a complete overview of the SAR measurement equipment.

Devices used during the test described are marked ☒

	Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
					Last Cal.	Due Date
☒	MVG	E FIELD PROBE	SSE2	3423-EPGO-426	Oct. 12, 2025	Oct. 11, 2026
☐	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	1800 MHz Dipole	SID1800	SN 03/15 DIP 1G800-349	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	2300 MHz Dipole	SID2300	SN 03/16 DIP 2G300-358	Feb. 22, 2024	Feb. 21 2027
☒	MVG	2450 MHz Dipole	SID2450	SN 03/15 DIP 2G450-352	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	2600 MHz Dipole	SID2600	SN 03/15 DIP 2G600-356	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	5000 MHz Dipole	SWG5500	SN 13/14 WGA 33	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	Liquid measurement Kit	SCLMP	SN 21/15 OCPG 72	NCR	NCR
☒	MVG	Power Amplifier	N/A	AMPLISAR_28/14_003	NCR	NCR
☒	KEITHLEY	Millivoltmeter	2000	4072790	May. 7, 2026	May. 6, 2027
☐	R&S	Universal radio communication tester	CMU200	105747	Apr. 8, 2026	Apr. 7, 2027
☐	R&S	Wideband radio communication	CMW500	103917	Apr.27,	Apr.26,

		tester			2026	2027
☐	Anritsu	4G LTE comprehensive tester	MT8821C	6262192315	Apr.8 2026	Apr.7 2027
☐	Anritsu	5G NR comprehensive tester	MT8000A	6262186364	Apr.8 2026	Apr.7 2027
☒	Hp/Agilent	Network Analyzer	8753D	3410J01136	Apr.15 , 2026	Apr.14, 2027
☒	Agilent	Calibration Kit	85033E	N/A	May. 31, 2024	May. 30, 2027
☒	Agilent	MXG Vector Signal Generator	N5182A	MY47070317	Apr.8 2026	Apr.7 2027
☒	Agilent	Power sensor	E4419B	MY45102538	Apr.8 2026	Apr.7 2027
☒	Agilent	Power sensor	E9301A	US39212148	Apr.8 2026	Apr.7 2027
☒	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Apr. 26, 2024	Apr. 25, 2027
☒	N/A	Thermometer	N/A	LES-085	Mar. 15, 2026	Mar. 14, 2027
☒	MVG	SAM Phantom	SSM2	SN 16/15 SAM119	NCR	NCR
☒	MVG	Device Holder	SMPPD	SN 16/15 MSH100	NCR	NCR

Measurement Software

Manufacturer	Software Name	Software Version
SATIMO	OpenSAR	V5.3.15.11

3. SAR Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.

(b) Read the WWAN RF power level from the base station simulator.

(c) For WLAN/Bluetooth power measurement, use engineering software to configure EUT WLAN/Bluetooth continuously transmission, at maximum RF power in each supported wireless interface and frequency band.

(d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/Bluetooth output power.

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/Bluetooth continuously transmission, at maximum RF power, in the highest power channel.

(b) Place the EUT in the positions as Appendix A demonstrates.

(c) Set scan area, grid size and other setting on the OPENSAR software.

(d) Measure SAR results for the highest power channel on each testing position.

(e) Find out the largest SAR result on these testing positions of each band.

(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg.

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement

(b) Area scan

(c) Zoom scan

(d) Power drift measurement

3.1. Power Reference

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

3.2. Area scan & Zoom scan

The area scan is a 2D scan to find the hot spot location on the DUT. The zoom scan is a 3D scan

above the hot spot to calculate the 1g and 10g SAR value.

Measurement of the SAR distribution with a grid of 8 to 16 mm * 8 to 16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme. Around this point, a cube of 30 * 30 *30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8 * 4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that will not be within the zoom scan of other peaks; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR compliance limit (e.g., 1 W/kg for 1,6 W/kg 1 g limit, or 1,26 W/kg for 2 W/kg, 10 g limit).

Area scan & Zoom scan scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

3.3. Description of interpolation/extrapolation scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimise measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1 mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

3.4. Volumetric Scan

The volumetric scan consists to a full 3D scan over a specific area. This 3D scan is useful form multi Tx SAR measurement. Indeed, it is possible with OpenSAR to add, point by point, several volumetric scan to calculate the SAR value of the combined measurement as it is define in the standard IEEE1528 and IEC62209.

3.5. Power Drift

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In OpenSAR measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in V/m. If the power drifts more than ±5%, the SAR will be retested.

4. System Verification Procedure

4.1. Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% of weight)	Head Tissue									
Frequency Band (MHz)	750	835	900	1800	1900	2000	2450	2600	5200	5800
Water	34.40	34.40	34.40	55.36	55.36	57.87	57.87	57.87	65.53	65.53
NaCl	0.79	0.79	0.79	0.35	0.35	0.16	0.16	0.16	0.00	0.00
1,2-Propanediol	64.81	64.81	64.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	30.45	30.45	19.97	19.97	19.97	24.24	24.24
DGBE	0.00	0.00	0.00	13.84	13.84	22.00	22.00	22.00	10.23	10.23

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid depth from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm.

Photo of Liquid depth for Head Position	Photo of Liquid depth for Body Position
	

4.1.1. Tissue Dielectric Parameter Check Results

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameter are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within ±5% of the target values.

Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Delta(%)		Liquid Temp.	Test Date
		εr	σ (S/m)	εr	σ (S/m)	εr	σ (S/m)		
Head 2450	2450	39.20	1.80	41.04	1.82	4.69	1.11	21.1 °C	Jun. 11, 2026
Head 5200	5200	36.00	4.66	36.54	4.54	1.50	-2.58	21.2 °C	Jun. 19, 2026
Head 5400	5400	35.80	4.86	34.36	4.84	-4.02	-0.41	21.4 °C	Jun. 17, 2026
Head 5600	5600	35.50	5.07	34.76	4.99	-2.08	-1.58	21.6 °C	Jun. 18, 2026
Head 5800	5800	35.30	5.27	35.99	5.29	1.95	0.38	21.0 °C	Jun. 20, 2026

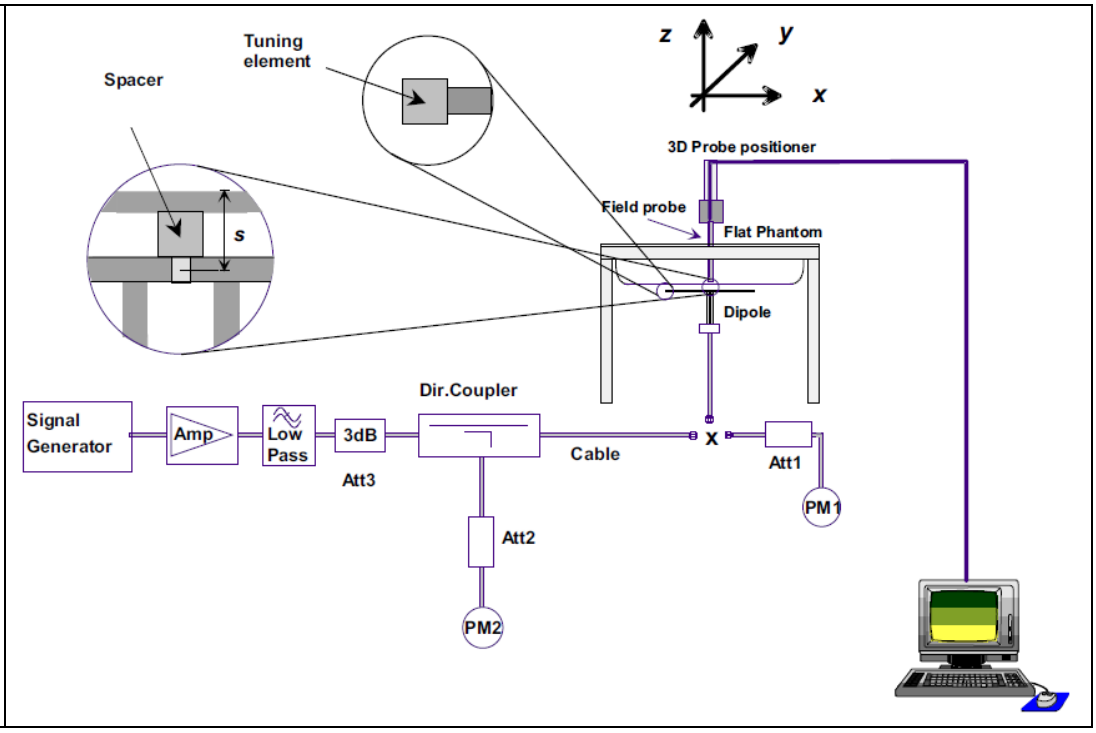
NOTE: 1.The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

2. Tested by : Max Zhou

4.2. System Verification Procedure

The system verification is performed for verifying the accuracy of the complete measurement system and performance of the software. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 100mW (below 5GHz) or 10mW (above 5GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system verification to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system verification to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

The system verification is shown as below picture:



4.2.1. System Verification Results

Comparing to the original SAR value provided by SATIMO, the verification data should be within its specification of ±10%. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance verification can meet the variation criterion and the plots can be referred to Appendix B of this report.

System Verification	Target SAR (1W)		Measured SAR			Measured SAR (Normalized to 1W)		Delta (%)		Liquid Temp.	Test Date
	1-g (W/Kg)	10-g (W/Kg)	Input Power (mW)	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)	1-g (%)	10-g (%)		
2450MHz	50.05	23.80	100.00	5.21	2.43	52.07	24.27	4.04	1.97	21.1 °C	Jun. 11, 2026
5200MHz	162.59	56.21	10.00	1.50	0.53	149.50	53.40	-8.05	-5.00	21.2 °C	Jun. 19, 2026
5400MHz	159.81	55.00	10.00	1.44	0.52	144.00	51.50	-9.89	-6.36	21.4 °C	Jun. 17, 2026
5600MHz	179.15	61.01	10.00	1.71	0.59	171.40	58.60	-4.33	-3.95	21.6 °C	Jun. 18, 2026
5800MHz	182.20	61.32	10.00	1.73	0.63	173.30	63.10	-4.88	2.90	21.0 °C	Jun. 20, 2026

Tested by : Max Zhou

5. SAR Measurement variability and uncertainty

5.1. SAR measurement variability

Per IEC/IEEE 62209-1528 SAR measurement 4 MHz to 10 GHz, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

5.2. Uncertainty Evaluation For System Performance Check

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEC/IEEE 62209-1528. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Uncertainty Component	Tol. (±%)	Prob. Dist.	Div.	Ci (1 g)	Ci (10 g)	1 g Ui (±%)	10 g Ui (±%)	Vi
Measurement System								
Probe Calibration	7	N	1	1	1	7	7	∞
Axial Isotropy	3.5	R	√3	1	1	2.02	2.02	∞
Hemispherical Isotropy	5.9	R	√3	0	0	0	0	∞
Boundary Effect	1	R	√3	1	1	0.58	0.58	∞
Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System Detection Limits	1	R	√3	1	1	0.58	0.58	∞
Modulation response	0	R	√3	0	0	0	0	∞
Readout Electronics	0.5	N	1	1	1	0.5	0.5	∞
Response Time	0	R	√3	0	0	0	0	∞
Integration Time	1.4	R	√3	0	0	0	0	∞
RF Ambient Conditions - Noise	3	R	√3	1	1	1.73	1.73	∞

RF Ambient Conditions - Reflections	3	R	√3	1	1	1.73	1.73	∞
Probe Positioner Mechanical Tolerance	1.4	R	√3	1	1	0.81	0.81	∞
Probe Positioning with respect to Phantom Shell	1.4	R	√3	1	1	0.81	0.81	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	2.3	R	√3	1	1	1.33	1.33	∞
Dipole								
Deviation of experimental source from numerical source	5	N	1	1	1	5	5	∞
Input power and SAR drift measurement	0.5	N	1	1	1	0.5	0.5	∞
Dipole axis to liquid Distance	2	R	√3	1	1	1.15	1.15	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (shape and thickness tolerances)	4	R	√3	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation (in permittivity and conductivity)	2	N	1	1	0.84	2	1.68	∞
Liquid Conductivity (temperature uncertainty)	2.5	R	√3	0.78	0.71	1.13	1.02	∞
Liquid conductivity - measurement uncertainty	1.59	N	1	0.23	0.26	0.37	0.41	99
Liquid permittivity (temperature uncertainty)	2.5	R	√3	0.23	0.26	0.33	0.38	∞
Liquid permittivity - measurement uncertainty	1.65	N	1	0.23	0.26	0.38	0.43	99
Combined Standard Uncertainty		RSS				10.35	10.24	
Expanded Uncertainty (95% Confidence interval)		k				20.70	20.48	

5.3. Uncertainty Evaluation For EUT SAR Test

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEC/IEEE 62209-1528. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Uncertainty Component	Tol. (±%)	Prob. Dist.	Div.	Ci (1 g)	Ci (10 g)	1 g Ui (±%)	10 g Ui (±%)	Vi
Measurement System								
Probe Calibration	7	N	1	1	1	7	7	∞
Axial Isotropy	3.5	R	√3	0.71	0.71	1.43	1.43	∞
Hemispherical Isotropy	5.9	R	√3	0.71	0.71	2.41	2.41	∞
Boundary Effect	1	R	√3	1	1	0.58	0.58	∞

Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System Detection Limits	1	R	√3	1	1	0.58	0.58	∞
Modulation response	10	R	√3	1	1	5.77	5.77	∞
Readout Electronics	0.5	N	1	1	1	0.5	0.5	∞
Response Time	0	R	√3	1	1	0	0	∞
Integration Time	1.4	R	√3	1	1	0.81	0.81	∞
RF Ambient Conditions - Noise	3	R	√3	1	1	1.73	1.73	∞
RF Ambient Conditions - Reflections	3	R	√3	1	1	1.73	1.73	∞
Probe Positioner Mechanical Tolerance	1.4	R	√3	1	1	0.81	0.81	∞
Probe Positioning with respect to Phantom Shell	1.4	R	√3	1	1	0.81	0.81	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	2.3	R	√3	1	1	1.33	1.33	∞
Test sample Related								
Test Sample Positioning	2.6	N	1	1	1	2.6	2.6	11
Device Holder Uncertainty	3	N	1	1	1	3	3	7
Output Power Variation - SAR drift measurement	5	N	1	1	1	5	5	∞
SAR scaling	2	R	√3	1	1	1.15	1.15	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (shape and thickness tolerances)	4	R	√3	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation (in permittivity and conductivity)	2	N	1	1	0.84	2	1.68	∞
Liquid Conductivity (temperature uncertainty)	2.5	R	√3	0.78	0.71	1.13	1.02	∞
Liquid conductivity - measurement uncertainty	1.59	N	1	0.23	0.26	0.37	0.41	99
Liquid permittivity (temperature uncertainty)	2.5	R	√3	0.23	0.26	0.33	0.38	∞
Liquid permittivity - measurement uncertainty	1.65	N	1	0.23	0.26	0.38	0.43	99
Combined Standard Uncertainty		RSS				12.51	12.42	
Expanded Uncertainty (95% Confidence interval)		k				25.02	24.84	

6. RF Exposure Positions

6.1. Generic device

The SAR evaluation shall be performed for surface of the DUT that are accessible during intended use, as indicated in Figure 6.1. Adjust the distance between the device surface and the flat phantom to 0mm.

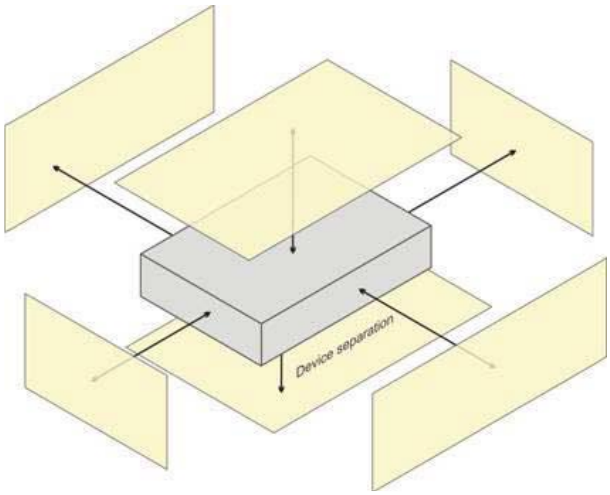


Figure 6.1 – Test positions for generic device

7. RF Output Power

7.1. WLAN & Bluetooth Output Power

7.1.1. Output Power Results Of WLAN

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11b	1	2412	14.00	13.64
	6	2437	14.00	13.53
	11	2462	14.00	13.57
802.11g	1	2412	13.00	12.79
	6	2437	13.00	12.23
	11	2462	13.00	12.16
802.11n HT20	1	2412	13.00	12.81
	6	2437	13.00	12.45
	11	2462	13.00	12.31
802.11n HT40	3	2422	13.00	12.90
	6	2437	13.00	12.85
	9	2452	13.00	12.81

NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	36	5180	12.00	11.72
	40	5200	12.00	11.73
	48	5240	12.00	11.89
802.11n HT20	36	5180	12.00	11.27
	40	5200	12.00	11.29
	48	5240	12.00	11.91
802.11n HT40	38	5190	12.00	11.33
	46	5230	12.00	11.80
802.11ac VHT20	36	5180	12.00	11.09
	40	5200	12.00	11.30
	48	5240	12.00	11.61
802.11ac VHT40	38	5190	12.00	11.26
	46	5230	12.00	11.92
802.11ac VHT80	42	5210	12.00	11.53

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	52	5260	12.00	11.98
	56	5280	12.00	11.52
	64	5320	12.00	10.77
802.11n HT20	52	5260	12.00	11.54
	56	5280	12.00	11.45
	64	5320	12.00	10.49
802.11n HT40	54	5270	11.50	11.46
	62	5310	11.50	11.10
802.11ac VHT20	52	5260	12.50	12.01
	56	5280	12.50	11.50
	64	5320	12.50	11.03
802.11ac VHT40	54	5270	11.50	11.48
	62	5310	11.50	10.99
802.11ac VHT80	58	5290	11.50	11.03

NOTE: Power measurement results of WLAN 5.3G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	100	5500	11.50	10.97
	120	5600	11.50	10.84
	140	5700	11.50	11.50
802.11n	100	5500	11.50	10.67
	120	5600	11.50	10.69
	140	5700	11.50	11.48
802.11n	102	5510	11.50	10.54
	118	5590	11.50	10.42
	134	5670	11.50	11.28
802.11ac (VHT20)	100	5500	12.00	10.75
	120	5600	12.00	10.67
	140	5700	12.00	11.72
802.11ac (VHT40)	102	5510	11.00	10.61
	118	5590	11.00	10.43
	134	5670	11.00	10.88
802.11ac (VHT80)	106	5530	9.00	8.45

	122	5610	9.00	8.82

NOTE: Power measurement results of WLAN 5.6G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	149	5745	10.50	10.08
	157	5785	10.50	9.90
	165	5825	10.50	8.86
802.11n HT20	149	5745	10.00	9.96
	157	5785	10.00	9.80
	165	5825	10.00	8.75
802.11n HT40	151	5755	10.00	9.98
	159	5795	10.00	9.43
802.11ac VHT20	149	5745	10.00	9.95
	157	5785	10.00	9.76
	165	5825	10.00	8.74
802.11ac VHT40	151	5755	10.50	10.03
	159	5795	10.50	9.50
802.11ac VHT80	155	5775	10.50	10.06

NOTE: Power measurement results of WLAN 5.8G.

7.1.2. Output Power Results Of Bluetooth

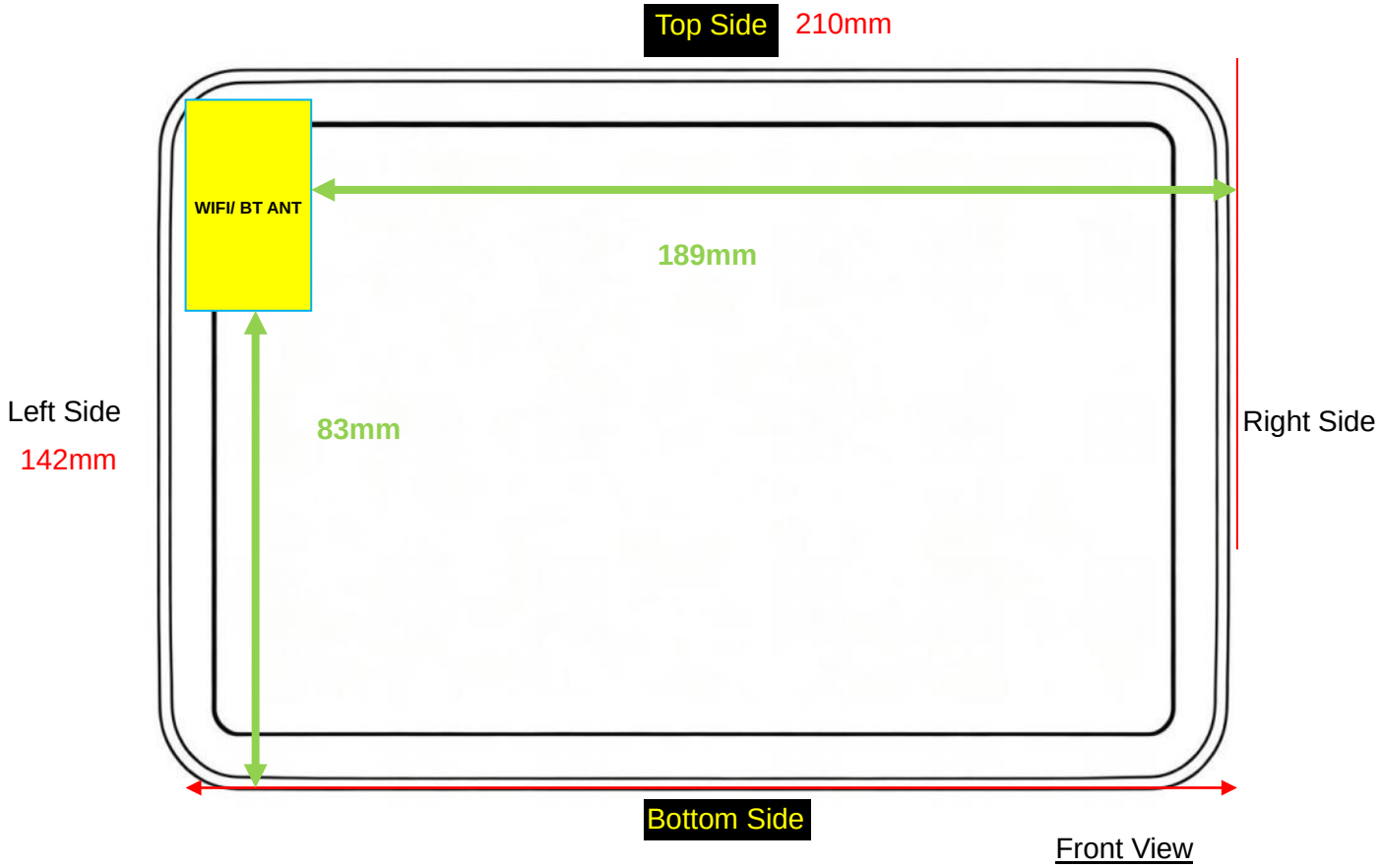
BR+EDR	Output Power (dBm)				
	Channel	Tune-up (dBm)	Data Rates		
			1M	2M	3M
	0CH	8.00	7.84	7.17	7.19
	39CH	11.00	10.30	10.39	10.41
	78CH	13.00	12.28	12.37	12.39

NOTE: Power measurement results of Bluetooth.

BLE	Output Power (dBm)				
	Data Rates	Tune-up (dBm)	Channe		
			0CH	19CH	39CH
	1M	-2.50	-3.93	-3.44	-2.90
	2M	-2.50	-3.92	-3.44	-2.90

NOTE: Power measurement results of Bluetooth.

8. Antenna Location



Note: Since the confidentiality request of EUT，the antenna location example diagram see as above.

Distance of the Antenna to the EUT surface/edge						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
WLAN & Bluetooth	5	5	5	189	5	83

Note: When the minimum separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Positions for WLAN & Bluetooth Ant1 SAR tests		
Test separation distances ≤ 50 mm		
Exposure Positions	Tune-up Maximum power of WLAN 2.4G	
	14.00dBm	25.12mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	10
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	10
	SAR testing required?	YES
Left Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	10
	SAR testing required?	YES

Top Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	10
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of BT	
	13.00dBm	19.95mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	10
	SAR testing required?	NO
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	10
	SAR testing required?	NO
Left Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	10
	SAR testing required?	NO
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	10
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.2G	
	12.00dBm	15.85mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	7
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	7
	SAR testing required?	YES
Left Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	7
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	7
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of WLAN 5.3G	
	12.50dBm	17.78mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	7
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	7
	SAR testing required?	YES
Left Side	Antenna to user(mm)	5

	SAR exclusion threshold（mW）	7
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	7
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of WLAN 5.6G	
	12.00dBm	15.85mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	6
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	6
	SAR testing required?	YES
Left Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	6
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	6
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of WLAN 5.8G	
	10.50dBm	11.22mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	6
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	6
	SAR testing required?	YES
Left Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	6
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold（mW）	6
	SAR testing required?	YES

Positions for WLAN & Bluetooth SAR tests		
Test separation distances > 50 mm		
Exposure Positions	Tune-up Maximum power of WLAN 2.4G	
	14.00dBm	25.12mW
Right Side	Antenna to user(mm)	189
	SAR exclusion threshold（mW）	1486

	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	83
	SAR exclusion threshold（mW）	426
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of BT	
	13.00dBm	19.95mW
Right Side	Antenna to user(mm)	189
	SAR exclusion threshold（mW）	1486
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	83
	SAR exclusion threshold（mW）	426
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.2G	
	12.00dBm	15.85mW
Right Side	Antenna to user(mm)	189
	SAR exclusion threshold（mW）	1456
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	83
	SAR exclusion threshold（mW）	396
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.3G	
	12.50dBm	17.78mW
Right Side	Antenna to user(mm)	189
	SAR exclusion threshold（mW）	1456
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	83
	SAR exclusion threshold（mW）	396
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.6G	
	12.00dBm	15.85mW
Right Side	Antenna to user(mm)	189
	SAR exclusion threshold（mW）	1455
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	83
	SAR exclusion threshold（mW）	395
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.8G	
	10.50dBm	11.22mW
Right Side	Antenna to user(mm)	189
	SAR exclusion threshold（mW）	1452

	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	83
	SAR exclusion threshold（mW）	392
	SAR testing required?	NO

9. Stand-alone SAR test exemption

Mode	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	SAR Exclusion threshold	SAR test exemption
Bluetooth LE	-2.50	0.562	5	2.48	3mW	YES

NOTE: Standalone SAR test exclusion for Bluetooth LE.

10. SAR Results

10.1. SAR measurement results

10.1.1. SAR measurement Result of WLAN 2.4G

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	6/2437	802.11b	0.323	0.151	3.89	13.53	14.00	0.360	2026/6/11	
Back Side	6/2437	802.11b	0.174	0.082	1.45	13.53	14.00	0.194	2026/6/11	
Left Side	6/2437	802.11b	0.742	0.355	3.32	13.53	14.00	0.827	2026/6/11	
Top Side	6/2437	802.11b	0.047	0.021	0.74	13.53	14.00	0.052	2026/6/11	
Left Side	1/2412	802.11b	1.042	0.490	-4.28	13.64	14.00	1.132	2026/6/11	6#
Left Side	11/2462	802.11b	0.916	0.436	1.88	13.57	14.00	1.011	2026/6/11	
Left Side Repeated	6/2437	802.11b	0.732	0.341	2.96	13.53	14.00	0.816	2026/6/11	
Left Side Repeated	1/2412	802.11b	1.021	0.471	-3.51	13.64	14.00	1.109	2026/6/11	
Left Side Repeated	11/2462	802.11b	0.899	0.425	2.63	13.57	14.00	0.993	2026/6/11	

NOTE : 1. Body SAR test results of WLAN 2.4G

2. Tested by : Max Zhou

3. Per KDB 865664 D01,if the ratio of largest to smallest SAR for the original and first repeated measurement is≤1.2 and the measured SAR＜1.45W/Kg, only one repeated measurement is required

10.1.2. SAR measurement Result of Bluetooth EDR

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	78/2480	3DH5	0.101	0.046	1.24	12.39	12.50	0.104	2026/6/11	
Back Side	78/2480	3DH5	0.055	0.026	0.46	12.39	12.50	0.056	2026/6/11	
Left Side	78/2480	3DH5	0.293	0.140	3.26	12.39	12.50	0.301	2026/6/11	1#
Top Side	78/2480	3DH5	0.014	0.012	2.76	12.39	12.50	0.014	2026/6/11	

Left Side	39/2441	1DH5	0.217	0.103	-1.44	10.39	10.50	0.223	2026/6/11	
Left Side	0/2402	1DH5	0.241	0.116	0.66	7.84	8.00	0.250	2026/6/11	

NOTE: 1.Body SAR test results of Bluetooth EDR

2. Tested by : Max Zhou

10.1.3. SAR measurement Result of WLAN 5.2G

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	42/5210	802.11ac VHT80	0.393	0.155	-3.92	11.53	12.00	0.438	2026/6/19	
Back Side	42/5210	802.11ac VHT80	0.154	0.079	1.53	11.53	12.00	0.172	2026/6/19	
Left Side	42/5210	802.11ac VHT80	0.614	0.233	-2.78	11.53	12.00	0.684	2026/6/19	2#
Top Side	42/5210	802.11ac VHT80	0.112	0.057	-0.18	11.53	12.00	0.125	2026/6/19	

NOTE: 1.Body SAR test results of WLAN5.2G

2. Tested by : Max Zhou

10.1.4. SAR measurement Result of WLAN 5.3G

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	52/5260	802.11ac VHT20	0.434	0.137	2.34	12.01	12.50	0.486	2026/6/17	
Back Side	52/5260	802.11ac VHT20	0.175	0.053	-3.10	12.01	12.50	0.196	2026/6/17	
Left Side	52/5260	802.11ac VHT20	0.706	0.239	-3.81	12.01	12.50	0.790	2026/6/17	3#
Top Side	52/5260	802.11ac VHT20	0.134	0.041	-2.48	12.01	12.50	0.150	2026/6/17	
Left Side	56/5280	802.11ac VHT20	0.608	0.207	0.00	11.50	12.50	0.765	2026/6/17	
Left Side	64/5320	802.11ac VHT20	0.526	0.191	0.25	11.03	12.50	0.738	2026/6/17	
Left Side Repeated	52/5260	802.11ac VHT20	0.685	0.216	-1.87	12.01	12.50	0.767	2026/6/17	

NOTE: 1.Body SAR test results of WLAN 5.3G

2. Tested by : Max Zhou

10.1.5. SAR measurement Result of WLAN 5.6G

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	140/5700	802.11ac VHT20	0.211	0.072	-1.58	11.72	12.00	0.225	2026/6/18	
Back Side	140/5700	802.11ac VHT20	0.083	0.028	-0.52	11.72	12.00	0.089	2026/6/18	
Left Side	140/5700	802.11ac VHT20	0.434	0.142	0.44	11.72	12.00	0.463	2026/6/18	4#
Top Side	140/5700	802.11ac VHT20	0.070	0.024	0.25	11.72	12.00	0.075	2026/6/18	
Left Side	100/5500	802.11ac VHT20	0.327	0.113	-1.62	10.75	12.00	0.436	2026/6/18	
Left Side	120/5600	802.11ac VHT20	0.291	0.104	-3.35	10.67	12.00	0.395	2026/6/18	

NOTE: 1.Body SAR test results of WLAN 5.6G

2. Tested by : Max Zhou

10.1.6. SAR measurement Result of WLAN 5.8G

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	155/5775	802.11ac VHT80	0.130	0.043	-3.28	10.06	10.50	0.144	2026/6/20	
Back Side	155/5775	802.11ac VHT80	0.058	0.020	-1.40	10.06	10.50	0.064	2026/6/20	
Left Side	155/5775	802.11ac VHT80	0.205	0.077	1.85	10.06	10.50	0.227	2026/6/20	5#
Top Side	155/5775	802.11ac VHT80	0.042	0.014	-1.74	10.06	10.50	0.046	2026/6/20	

NOTE: 1.Body SAR test results of WLAN 5.8G

2. Tested by : Max Zhou

10.2. Simultaneous Transmission Analysis

NO simultaneous transmissions are possible for this device of Bluetooth and 2.4G/5G Wi-Fi.

11. Appendix A. Photo documentation

Refer to appendix Test Setup photo---SAR

12. Appendix B. System Check Plots

Table of contents
MEASUREMENT 1 System Performance Check - 2450MHz
MEASUREMENT 2 System Performance Check - 5200MHz
MEASUREMENT 3 System Performance Check - 5400MHz
MEASUREMENT 4 System Performance Check - 5600MHz
MEASUREMENT 5 System Performance Check - 5800MHz

1# System check at 2450 MHz
Date of measurement: 11/6/2026

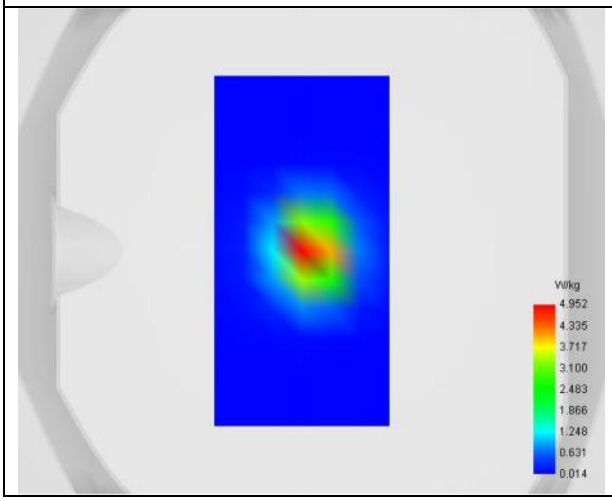
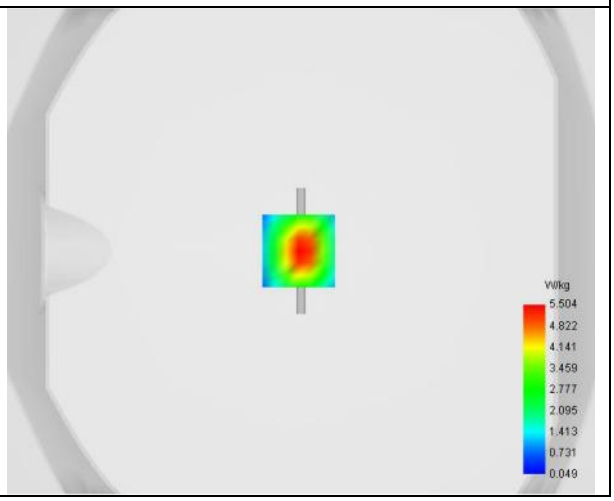
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.85
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Signal	CW
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	2450.00
Relative permitivity (real part)	41.04
Relative permitivity (imaginary part)	13.38
Conductivity (S/m)	1.82

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

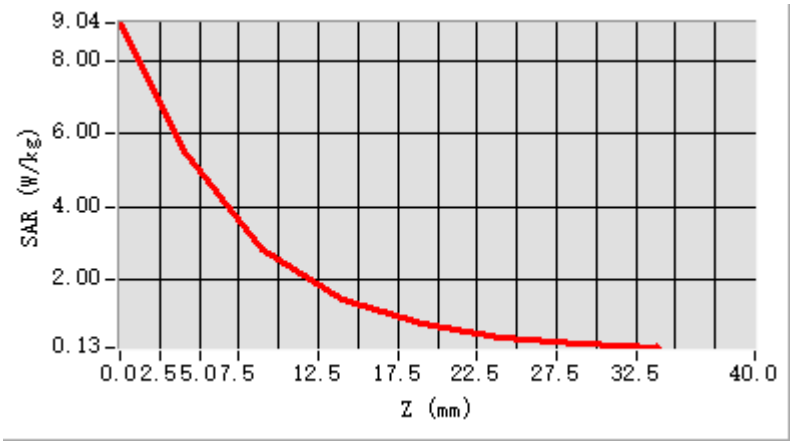
Maximum location: X=-1.00, Y=0.00 ; SAR Peak: 9.07 W/kg

D. SAR 1g & 10g

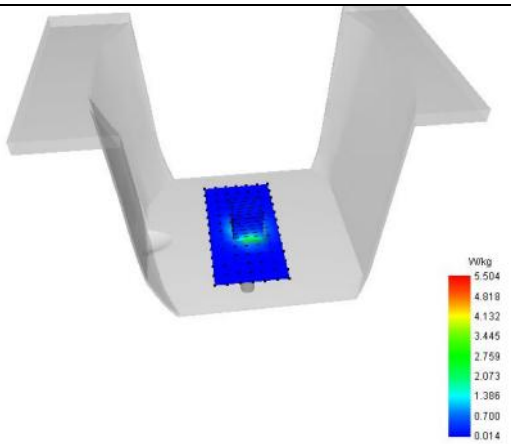
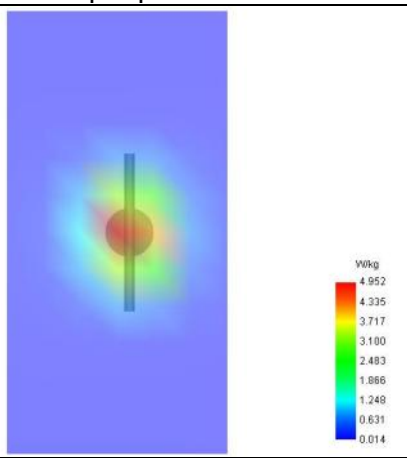
SAR 10g (W/Kg)	2.427
SAR 1g (W/Kg)	5.207
Variation (%)	-0.80
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	51.46

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	9.036	5.504	2.833	1.466	0.773	0.413	0.225



F. 3D Image

3D screen shot	Hot spot position
	

2# System check at 5200 MHz
Date of measurement: 19/6/2026

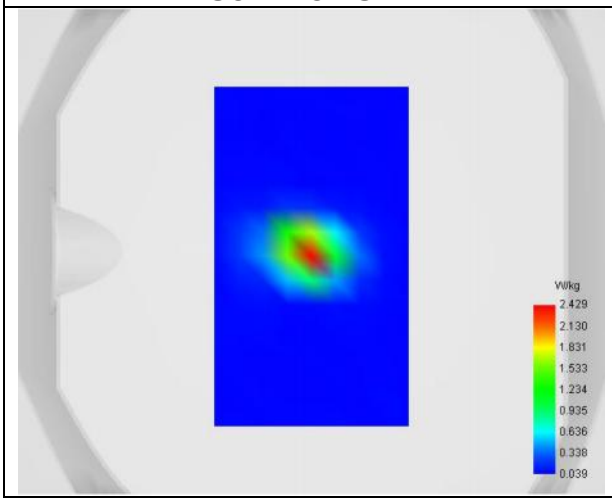
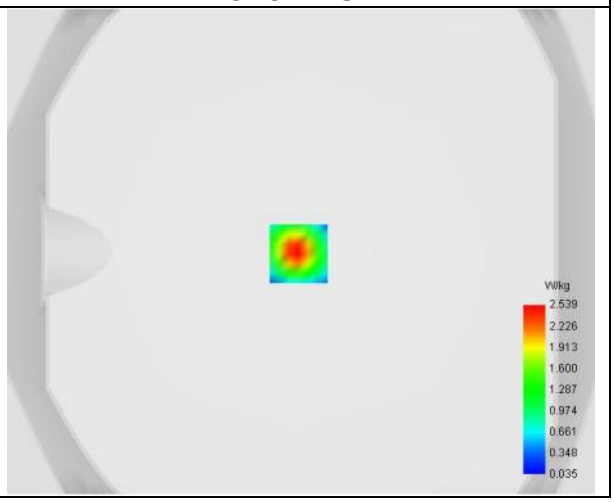
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.07
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5200
Signal	CW
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	5200.00
Relative permitivity (real part)	36.54
Relative permitivity (imaginary part)	15.70
Conductivity (S/m)	4.54

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

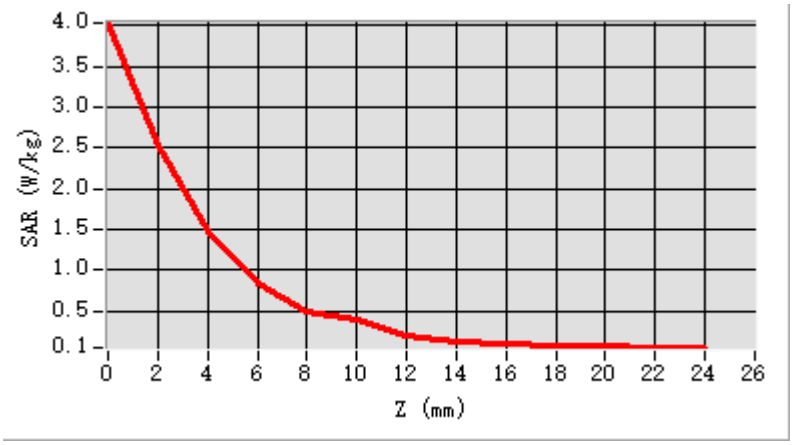
Maximum location: X=-1.00, Y=-1.00 ; SAR Peak: 4.22 W/kg

D. SAR 1g & 10g

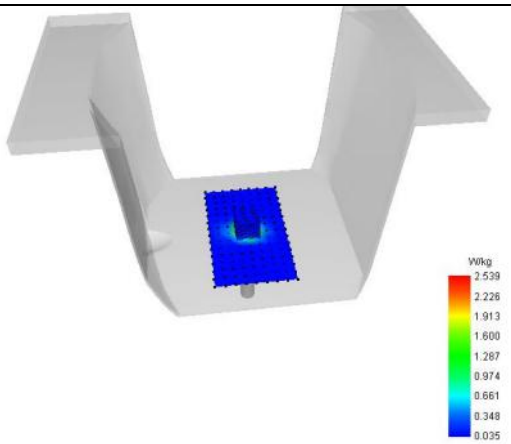
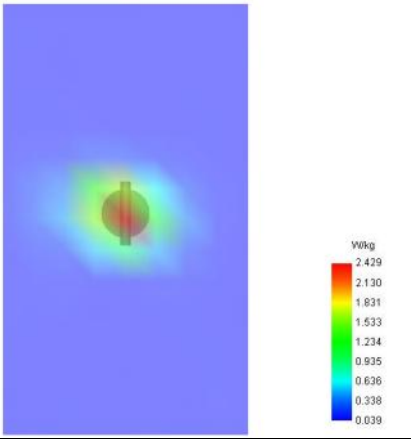
SAR 10g (W/Kg)	0.534
SAR 1g (W/Kg)	1.495
Variation (%)	-0.63
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	57.98

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	4.036	2.539	1.472	0.842	0.488	0.399	0.191	0.124	0.095	0.076	0.068	0.057



F. 3D Image

3D screen shot	Hot spot position
	

3# System check at 5400 MHz
Date of measurement: 17/6/2026

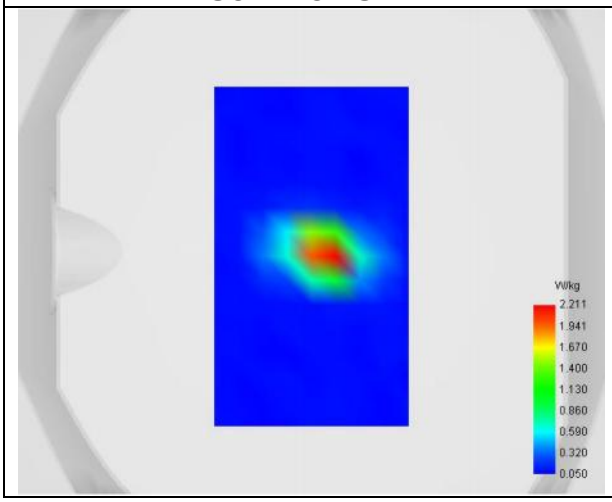
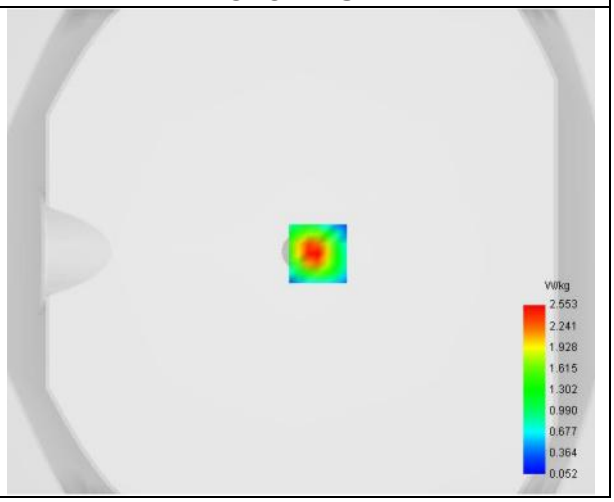
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.11
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5400
Signal	CW
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	5400.00
Relative permitivity (real part)	34.36
Relative permitivity (imaginary part)	16.12
Conductivity (S/m)	4.84

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

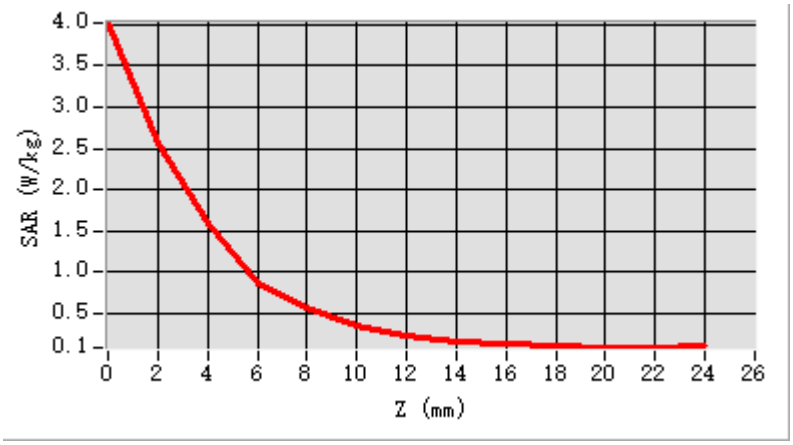
Maximum location: X=7.00, Y=-1.00 ; SAR Peak: 4.01 W/kg

D. SAR 1g & 10g

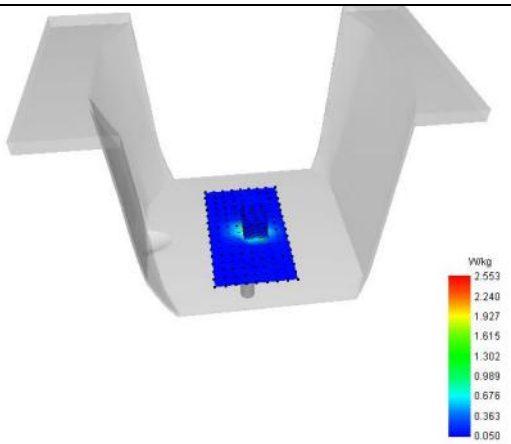
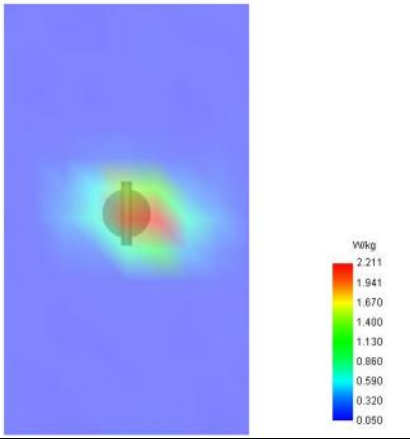
SAR 10g (W/Kg)	0.515
SAR 1g (W/Kg)	1.440
Variation (%)	-1.75
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	62.32

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	4.023	2.553	1.591	0.856	0.575	0.345	0.223	0.161	0.131	0.107	0.090	0.079



F. 3D Image

3D screen shot	Hot spot position
	

4# System check at 5600 MHz
Date of measurement: 18/6/2026

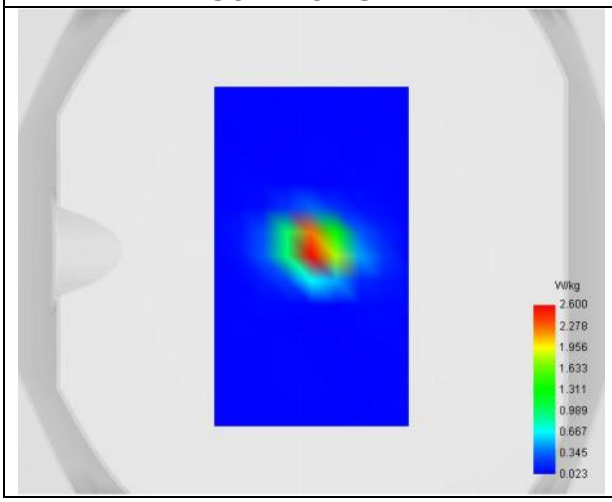
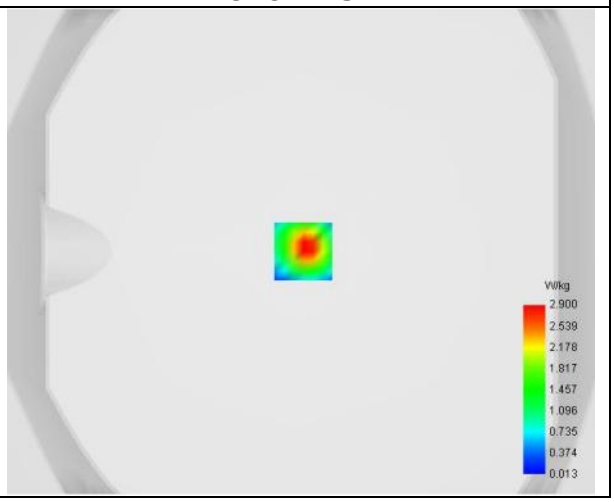
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.20
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5600
Signal	CW
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	5600.00
Relative permitivity (real part)	34.76
Relative permitivity (imaginary part)	16.03
Conductivity (S/m)	4.99

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

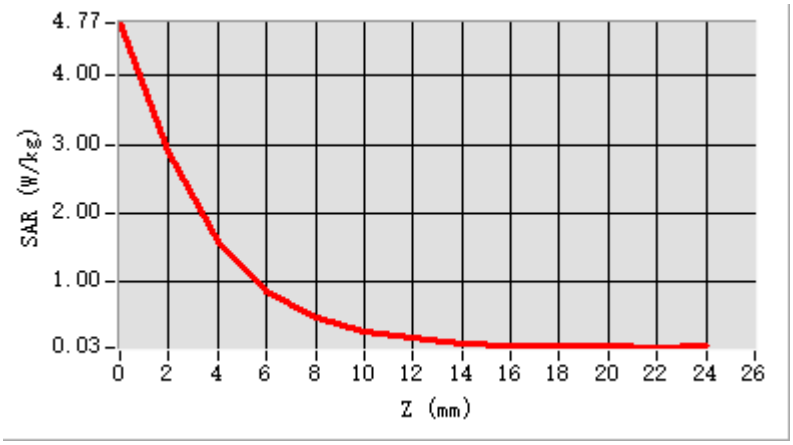
Maximum location: X=1.00, Y=0.00 ; SAR Peak: 5.12 W/kg

D. SAR 1g & 10g

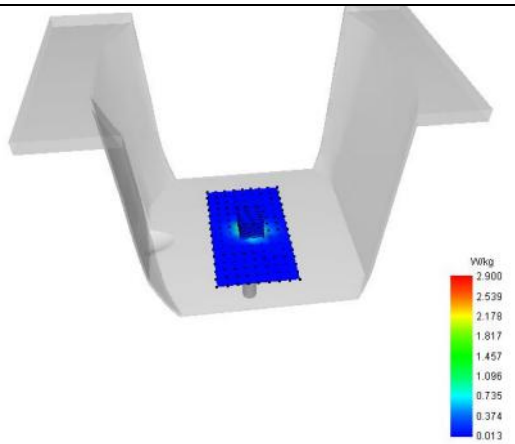
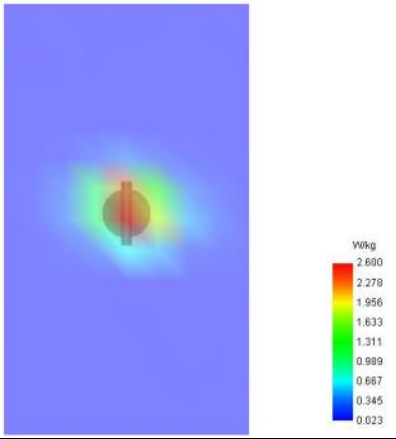
SAR 10g (W/Kg)	0.586
SAR 1g (W/Kg)	1.714
Variation (%)	1.49
Horizontal validation criteria: minimum distance (mm)	8.94
Vertical validation criteria: SAR ratio M2/M1 (%)	54.08

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	4.768	2.900	1.568	0.865	0.468	0.273	0.174	0.104	0.075	0.059	0.060	0.033



F. 3D Image

3D screen shot	Hot spot position
	

5# System check at 5800 MHz
Date of measurement: 20/6/2026

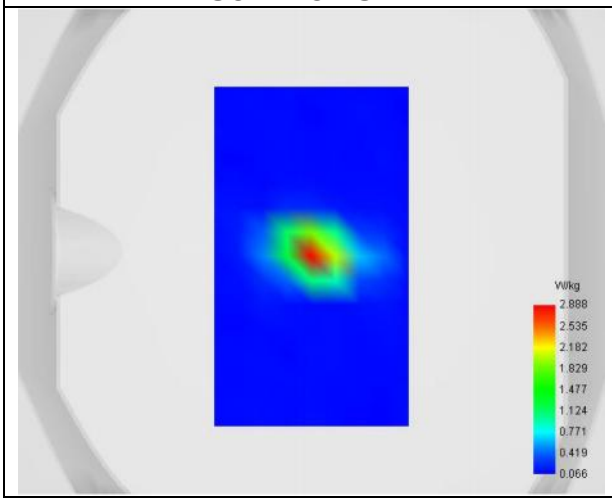
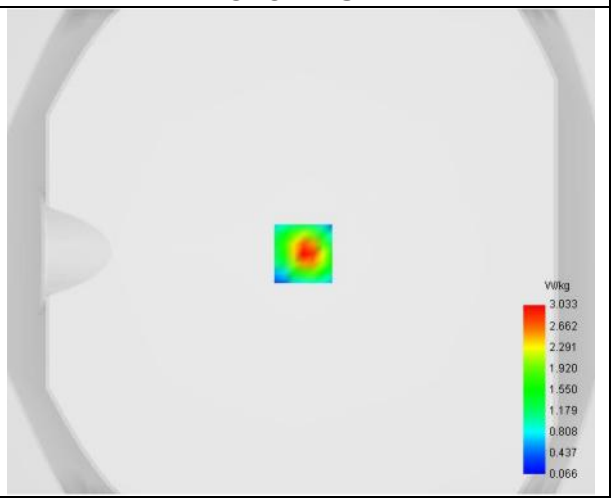
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.04
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5800
Signal	CW
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	5800.00
Relative permitivity (real part)	35.99
Relative permitivity (imaginary part)	16.41
Conductivity (S/m)	5.29

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

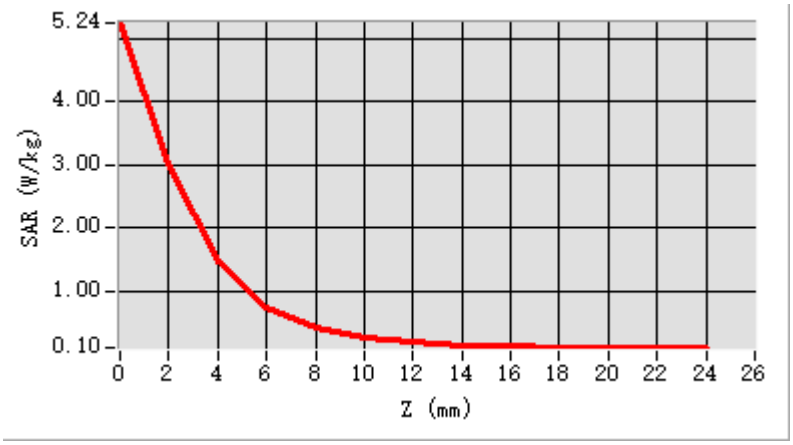
Maximum location: X=1.00, Y=-1.00 ; SAR Peak: 5.61 W/kg

D. SAR 1g & 10g

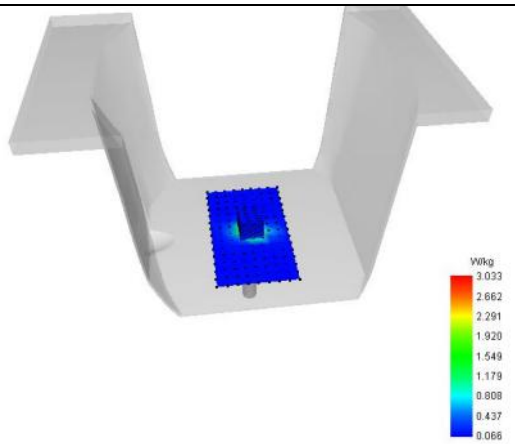
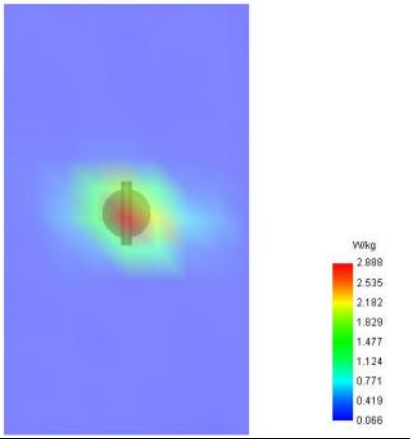
SAR 10g (W/Kg)	0.631
SAR 1g (W/Kg)	1.733
Variation (%)	-0.28
Horizontal validation criteria: minimum distance (mm)	8.94
Vertical validation criteria: SAR ratio M2/M1 (%)	48.70

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	5.243	3.033	1.477	0.720	0.410	0.245	0.184	0.142	0.117	0.111	0.095	0.106



F. 3D Image

3D screen shot	Hot spot position
	

13. Appendix C. SAR Measurement Plots

Table of contents
1# SAR Measurement at Bluetooth (Body, Validation Plane)
2# SAR Measurement at U-NII-1 (Body, Validation Plane)
3# SAR Measurement at U-NII-2a (Body, Validation Plane)
4# SAR Measurement at U-NII-2c (Body, Validation Plane)
5# SAR Measurement at U-NII-3 (Body, Validation Plane)
6# SAR Measurement at ISM (Body, Validation Plane)

1# SAR Measurement at Bluetooth (Body, Validation Plane)
Date of measurement: 11/6/2026

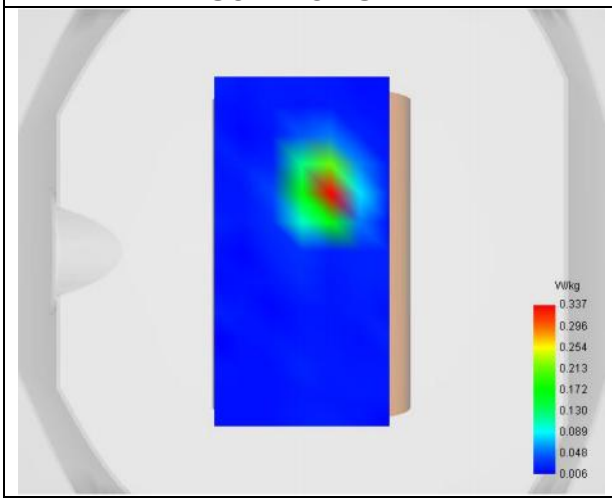
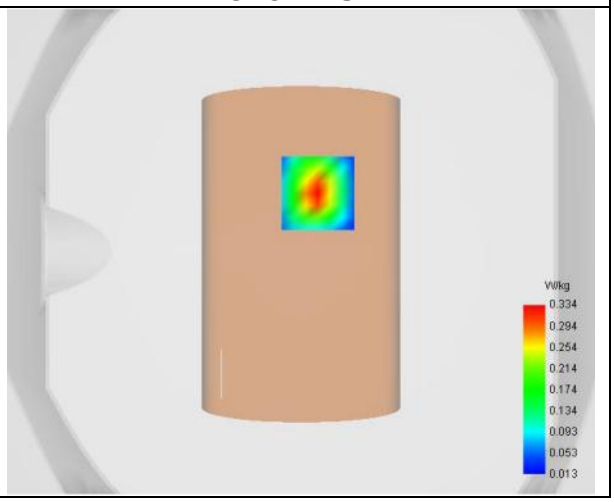
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.85
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	Bluetooth
Signal	Bluetooth
Channels/Frequency	Higher (78)/ frequency 2480.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2480.00
Relative permitivity (real part)	40.94
Relative permitivity (imaginary part)	13.53
Conductivity (S/m)	1.86

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

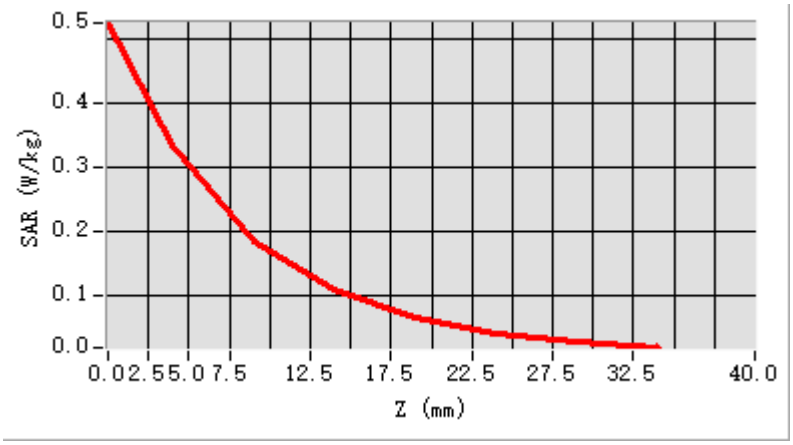
Maximum location: X=7.00, Y=24.00 ; SAR Peak: 0.52 W/kg

D. SAR 1g & 10g

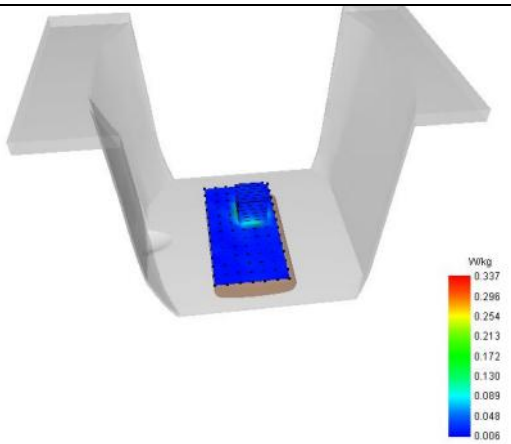
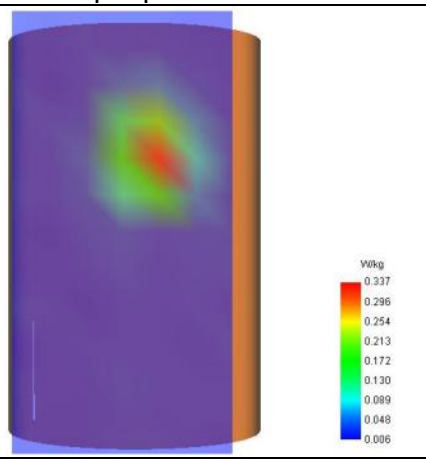
SAR 10g (W/Kg)	0.140
SAR 1g (W/Kg)	0.293
Variation (%)	3.26
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	55.36

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.526	0.334	0.185	0.112	0.066	0.042	0.030



F. 3D Image

3D screen shot	Hot spot position
	

2# SAR Measurement at U-NII-1 (Body, Validation Plane)
Date of measurement: 19/6/2026

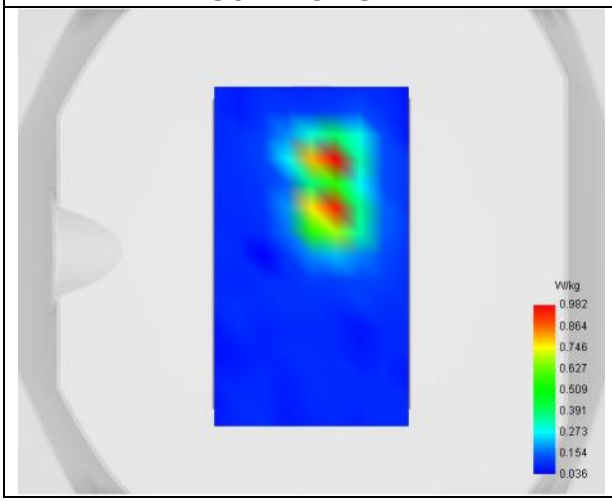
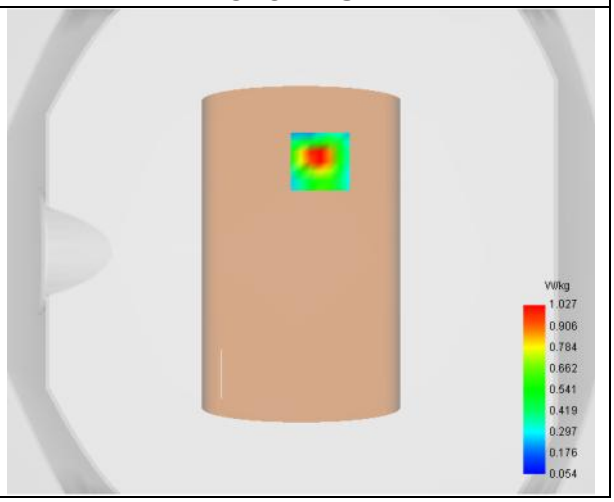
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.07
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-1
Signal	IEEE 802.11 ac
Channels/Frequency	Middle (42)/ frequency 5210.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5210.00
Relative permitivity (real part)	36.47
Relative permitivity (imaginary part)	15.68
Conductivity (S/m)	4.54

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

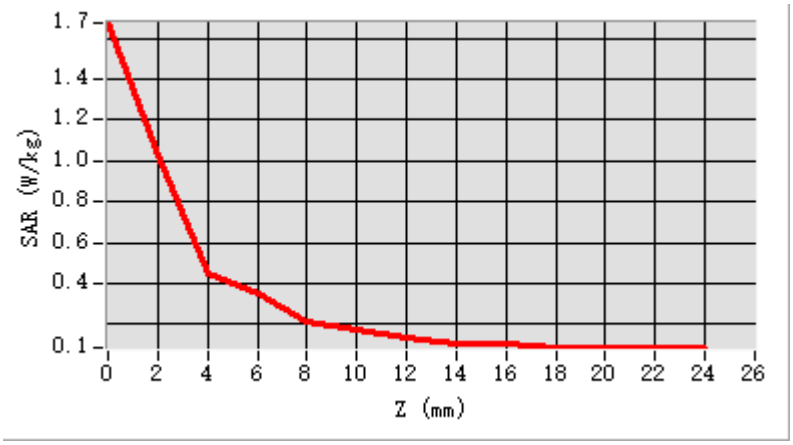
Maximum location: X=8.00, Y=37.00 ; SAR Peak: 1.88 W/kg

D. SAR 1g & 10g

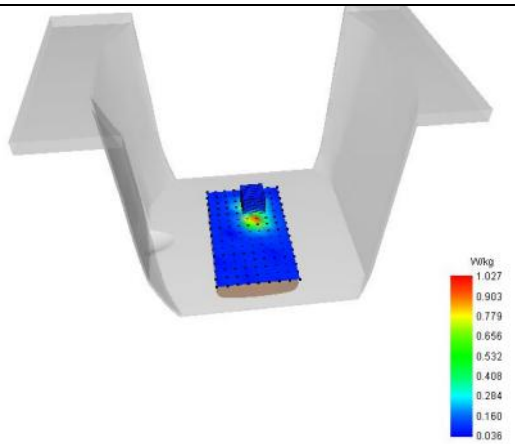
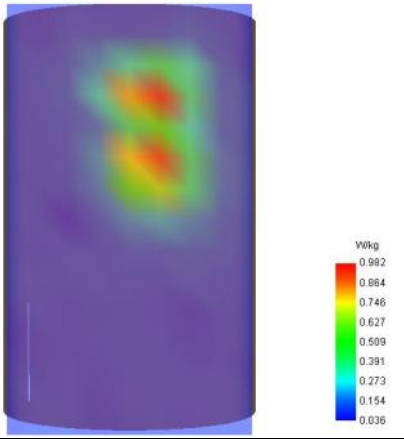
SAR 10g (W/Kg)	0.233
SAR 1g (W/Kg)	0.614
Variation (%)	-2.78
Horizontal validation criteria: minimum distance (mm)	5.66
Vertical validation criteria: SAR ratio M2/M1 (%)	57.23

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	1.675	1.027	0.451	0.355	0.217	0.170	0.132	0.105	0.102	0.091	0.089	0.091



F. 3D Image

3D screen shot	Hot spot position
	

3# SAR Measurement at U-NII-2a (Body, Validation Plane)
Date of measurement: 17/6/2026

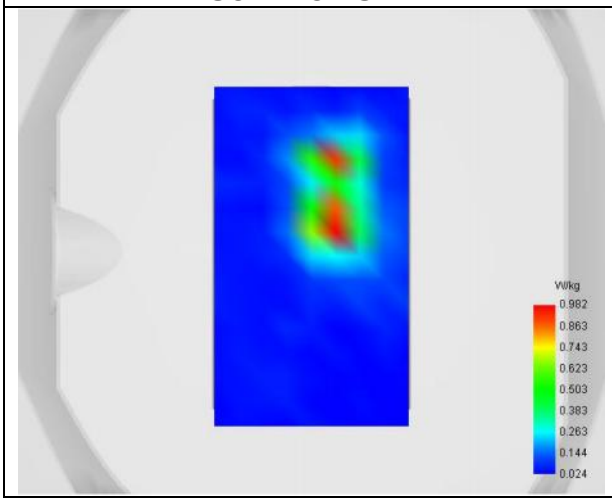
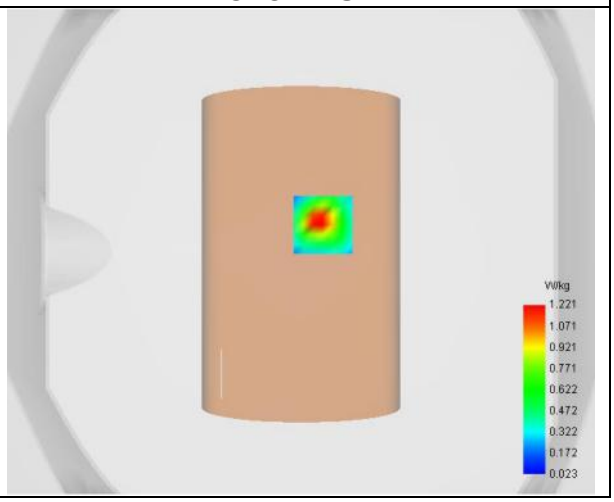
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.11
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-2a
Signal	IEEE 802.11 ac
Channels/Frequency	Lower (52)/ frequency 5260.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5260.00
Relative permitivity (real part)	34.81
Relative permitivity (imaginary part)	15.91
Conductivity (S/m)	4.65

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

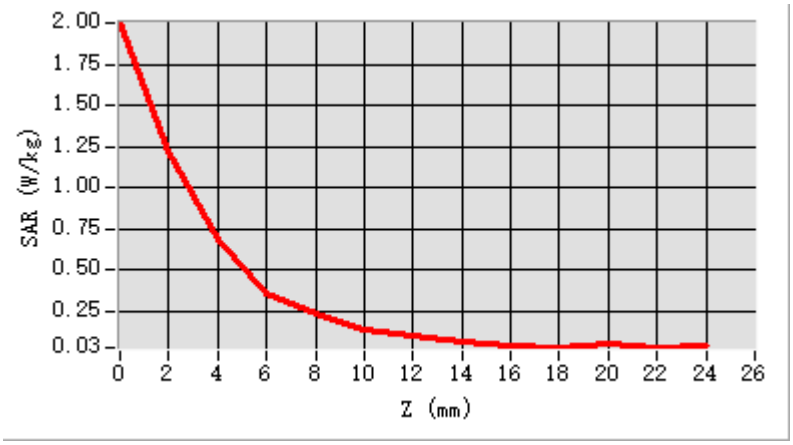
Maximum location: X=9.00, Y=11.00 ; SAR Peak: 2.17 W/kg

D. SAR 1g & 10g

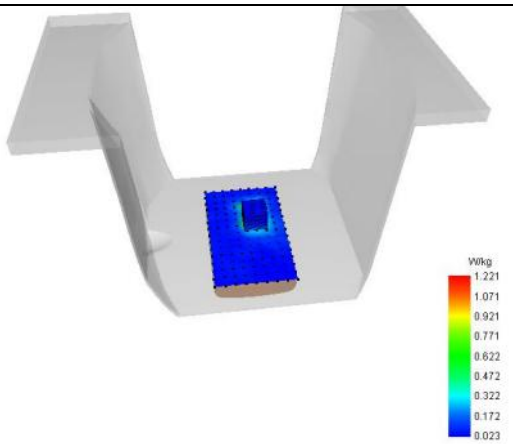
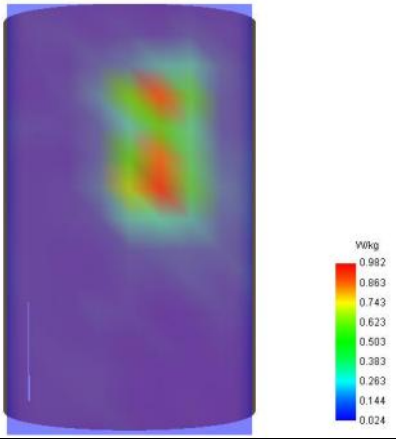
SAR 10g (W/Kg)	0.239
SAR 1g (W/Kg)	0.706
Variation (%)	-3.81
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	55.62

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	2.001	1.221	0.679	0.353	0.235	0.132	0.097	0.068	0.038	0.026	0.046	0.026



F. 3D Image

3D screen shot	Hot spot position
	

4# SAR Measurement at U-NII-2c (Body, Validation Plane)
Date of measurement: 18/6/2026

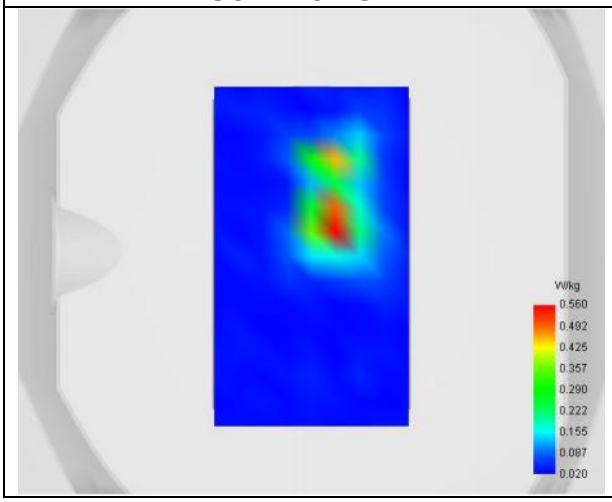
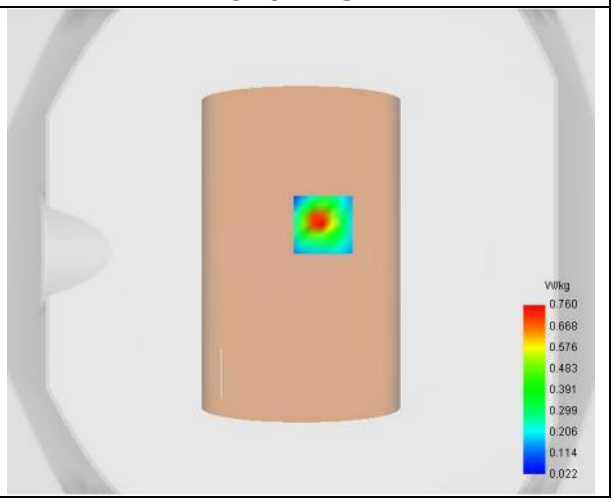
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.20
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-2c
Signal	IEEE 802.11 ac
Channels/Frequency	Higher (140)/ frequency 5700.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5700.00
Relative permitivity (real part)	34.43
Relative permitivity (imaginary part)	16.10
Conductivity (S/m)	5.10

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

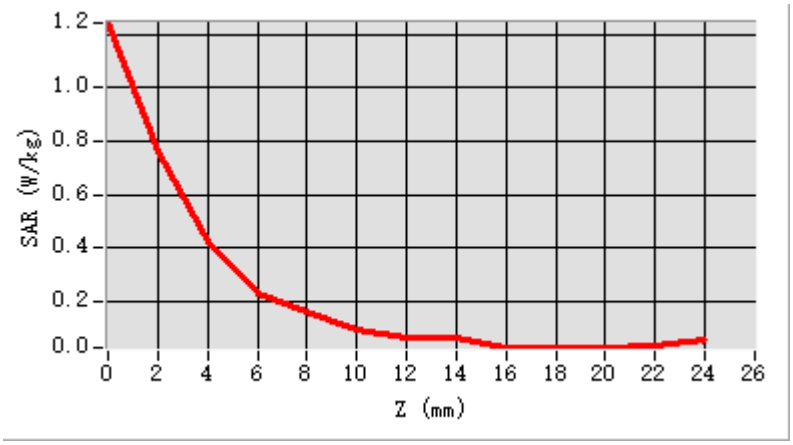
Maximum location: X=9.00, Y=11.00 ; SAR Peak: 1.40 W/kg

D. SAR 1g & 10g

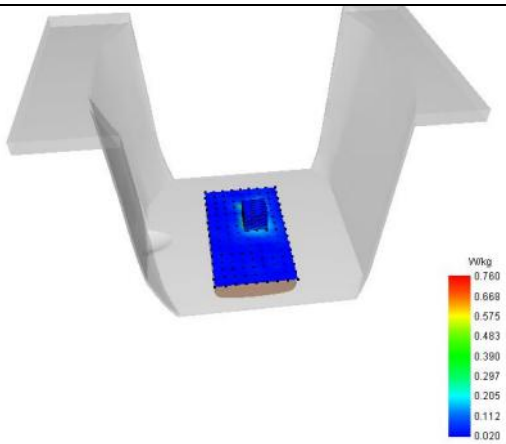
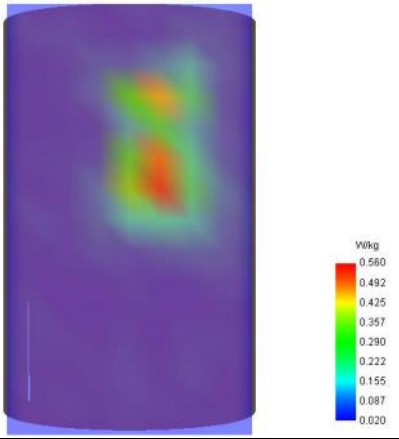
SAR 10g (W/Kg)	0.142
SAR 1g (W/Kg)	0.434
Variation (%)	0.44
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	55.24

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	1.243	0.760	0.420	0.231	0.164	0.093	0.066	0.060	0.026	0.025	0.027	0.031



F. 3D Image

3D screen shot	Hot spot position
	

5# SAR Measurement at U-NII-3 (Body, Validation Plane)
Date of measurement: 20/6/2026

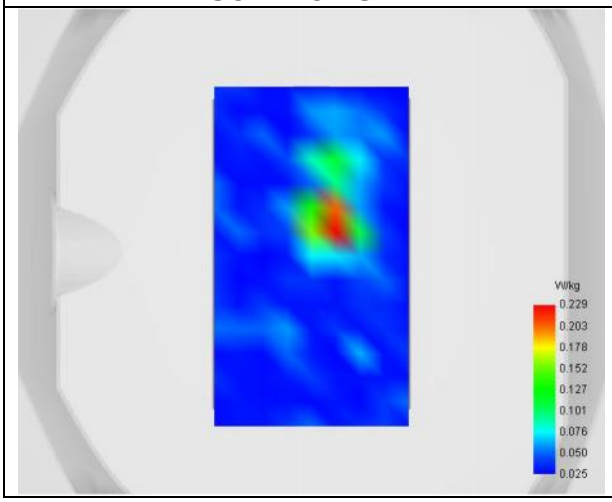
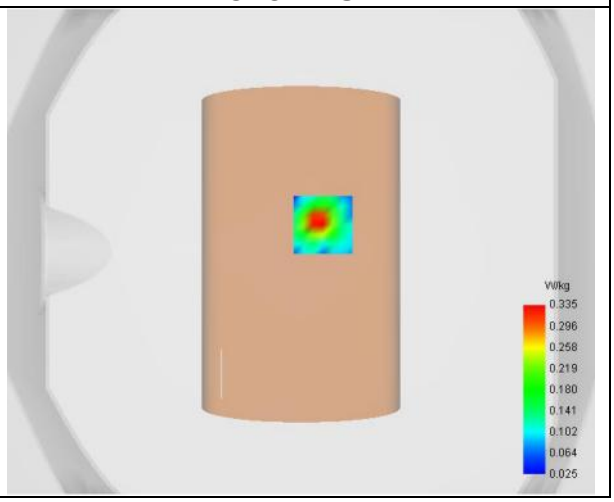
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.04
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-3
Signal	IEEE 802.11 ac
Channels/Frequency	Middle (155)/ frequency 5775.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5775.00
Relative permitivity (real part)	36.09
Relative permitivity (imaginary part)	16.43
Conductivity (S/m)	5.28

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

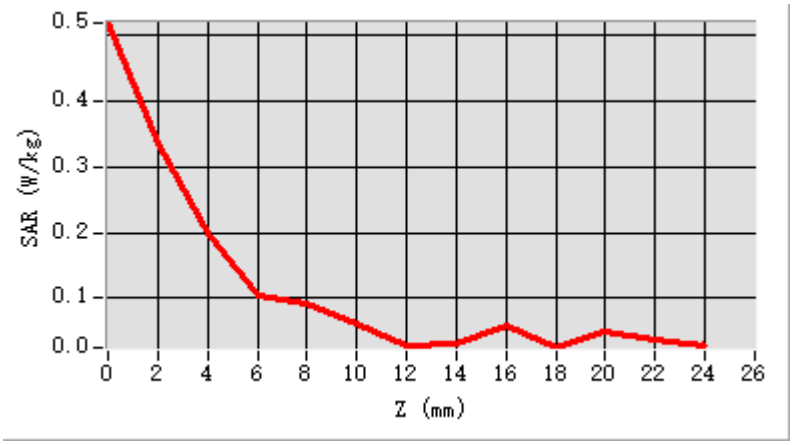
Maximum location: X=9.00, Y=11.00 ; SAR Peak: 0.64 W/kg

D. SAR 1g & 10g

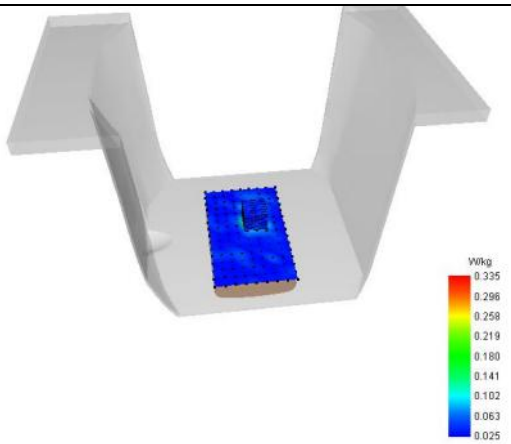
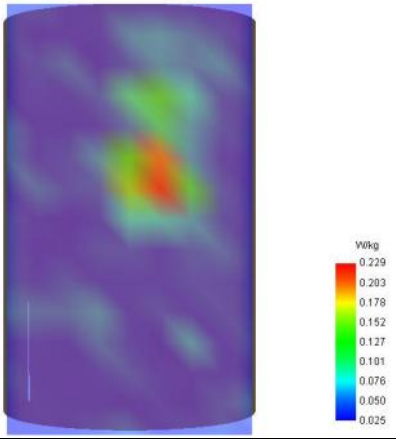
SAR 10g (W/Kg)	0.077
SAR 1g (W/Kg)	0.205
Variation (%)	1.85
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	59.27

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	0.519	0.335	0.199	0.105	0.091	0.063	0.028	0.030	0.059	0.025	0.050	0.038



F. 3D Image

3D screen shot	Hot spot position
	

6# SAR Measurement at ISM (Body, Validation Plane)
Date of measurement: 11/6/2026

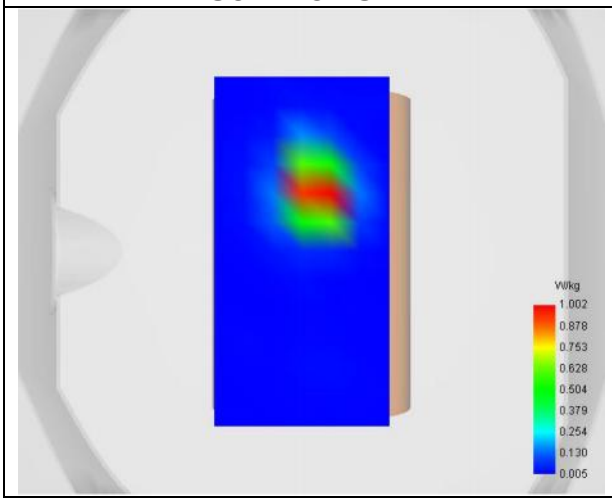
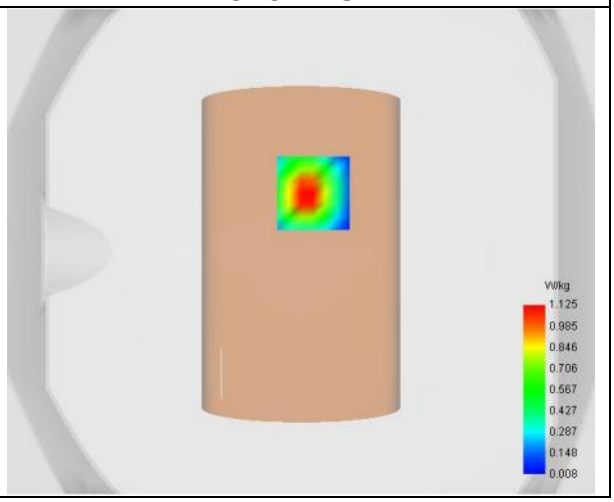
A. Experimental conditions.

Probe	3423-EPGO-426
ConvF	2.85
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	ISM
Signal	IEEE 802.11 b
Channels/Frequency	Lower (1)/ frequency 2412.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2412.00
Relative permitivity (real part)	41.13
Relative permitivity (imaginary part)	13.34
Conductivity (S/m)	1.79

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

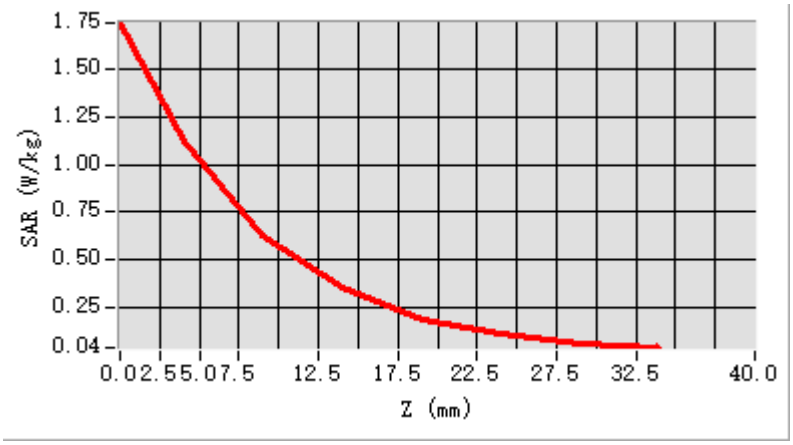
Maximum location: X=5.00, Y=24.00 ; SAR Peak: 1.79 W/kg

D. SAR 1g & 10g

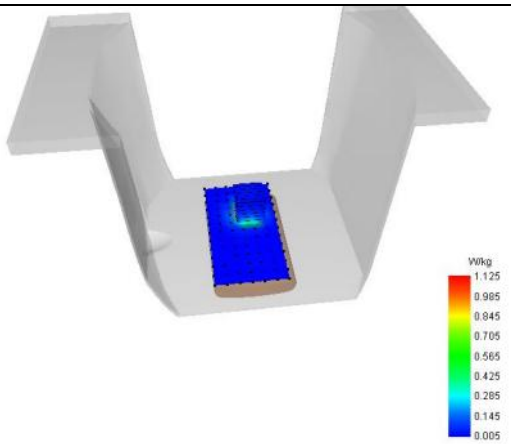
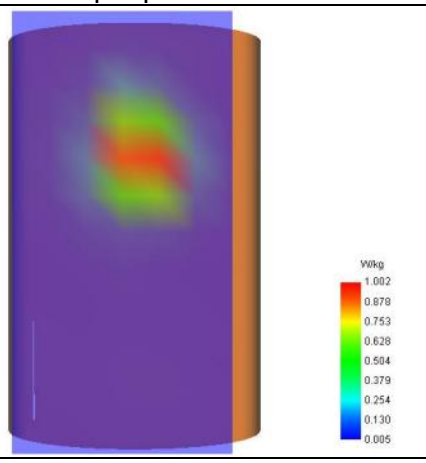
SAR 10g (W/Kg)	0.490
SAR 1g (W/Kg)	1.042
Variation (%)	-4.28
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	56.06

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.747	1.125	0.624	0.352	0.187	0.112	0.062



F. 3D Image

3D screen shot	Hot spot position
	

14. Appendix D. Calibration Certificate

Table of contents
E Field Probe -3423-EPGO-426
2450 MHz Dipole - SN 03/15 DIP 2G450-352
5000-6000 MHz Dipole - SN 13/14 WGA 33
<Justification of the extended calibration>

COMOSAR E-Field Probe Calibration Report

Ref : ACR.261.11.25.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.
BUILDING E, FENDA SCIENCE PARK, SANWEI COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: 3423-EPGO-426

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 10/12/2025

Accreditations #2-6789
Scope available on www.cofrac.fr

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed at MVG, using the CALIPROBE test bench, for use with a MVG COMOSAR system only. The test results covered by accreditation are traceable to the International System of Units (SI).

COMOSAR E-FIELD PROBE CALIBRATION REPORT Ref: ACR.261.11.25.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Cyrille ONNEE	Measurement Responsible	10/12/205	
Checked & approved by:	Jérôme Luc	Technical Manager	10/12/205	
Authorized by:	Yann Toutain	Laboratory Director	10/12/205	

Yann Toutain ID
Signature numérique de Yann Toutain ID
Date : 2025.10.12 09:35:27 +02'00'

	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	*Name*	*Date*	*Modifications*
A	Cyrille ONNEE	10/12/205	Initial release

TABLE OF CONTENTS

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	3423-EPGO-426
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-7.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.261 MΩ Dipole 2: R2=0.213 MΩ Dipole 3: R3=0.233 MΩ

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

MVG's COMOSAR E field Probes are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards.

Figure 1 – *MVG COMOSAR Dosimetric E field Probe*

Probe Length	330 mm
Length of Individual Dipoles	2 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.5 mm
Distance between dipoles / probe extremity	1 mm

3 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their effect. All calibrations / measurements performed meet the fore-mentioned standards.

3.1 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards for frequency range 600-7500MHz and using the calorimeter cell method (transfer method) as outlined in the standards for frequency 150-450 MHz.

3.2 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.

3.3 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 to 360 degrees in 15- degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

3.4 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

The boundary effect uncertainty can be estimated according to the following uncertainty approximation formula based on linear and exponential extrapolations between the surface and $d_{be} + d_{step}$ along lines that are approximately normal to the surface:

$$SAR_{uncertainty}[\%] = \delta SAR_{be} \frac{(d_{be} + d_{step})^2}{2d_{step}} \frac{(e^{-\kappa_e \Delta(\delta)})}{\delta/2} \quad \text{for } (d_{be} + d_{step}) < 10 \text{ mm}$$

where

$SAR_{uncertainty}$	is the uncertainty in percent of the probe boundary effect
d_{be}	is the distance between the surface and the closest *zoom-scan* measurement point, in millimetre
Δ_{step}	is the separation distance between the first and second measurement points that are closest to the phantom surface, in millimetre, assuming the boundary effect at the second location is negligible
δ	is the minimum penetration depth in millimetres of the head tissue-equivalent liquids defined in this standard, i.e., $\delta \approx 14$ mm at 3 GHz;
δSAR_{be}	in percent of SAR is the deviation between the measured SAR value, at the distance d_{be} from the boundary, and the analytical SAR value.

The measured worst case boundary effect SARuncertainty[%] for scanning distances larger than 4mm is 1.0% Limit ,2%).

4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty associated with a SAR probe calibration using the waveguide or calorimetric cell technique depending on the frequency.

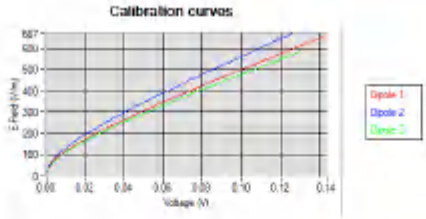
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-11% for the frequency range 150-450MHz.
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

5 CALIBRATION RESULTS

Ambient condition	
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

5.1 CALIBRATION IN AIR

The following curve represents the measurement in waveguide of the voltage picked up by the probe toward the E-field generated inside the waveguide.



From this curve, the sensitivity in air is calculated using the below formula.

$$E^2 = \sum_{i=1}^{3} \frac{V_i \left(1 + {}^{V_i}/_{DCP_i}\right)}{Norm_i}$$

where
Vi=voltage readings on the 3 channels of the probe
DCPi=diode compression point given below for the 3 channels of the probe
Normi=dipole sensitivity given below for the 3 channels of the probe

Normx dipole 1 (μV/(V/m)^2)	Normy dipole 2 (μV/(V/m)^2)	Normz dipole 3 (μV/(V/m)^2)
0.78	0.62	0.85

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
105	108	107

5.2 CALIBRATION IN LIQUID

The calorimeter cell or the waveguide is used to determine the calibration in liquid using the formula below.

$$ConvF = \frac{E^2_{liquid}}{E^2_{diff}}$$

The E-field in the liquid is determined from the SAR measurement according to the below formula.

$$E^2_{liquid} = \frac{\rho\, SAR}{\sigma}$$

where
σ=the conductivity of the liquid
ρ=the volumetric density of the liquid
SAR=the SAR measured from the formula that depends on the setup used. The SAR formulas are given below

For the calorimeter cell (150-450 MHz), the formula is:

$$SAR = c\frac{dT}{dt}$$

where
c=the specific heat for the liquid
dT/dt=the temperature rises over the time

For the waveguide setup (600-75000 MHz), the formula is:

$$SAR = \frac{4Pw}{ab\delta} e^{\frac{-2z}{\delta}}$$

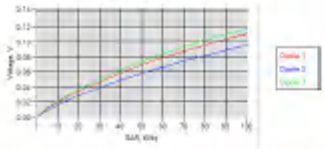
where
a=the larger cross-sectional of the waveguide
b=the smaller cross-sectional of the waveguide
δ=the skin depth for the liquid in the waveguide
Pw=the power delivered to the liquid

The below table summarize the ConvF for the calibrated liquid. The curves give examples for the measured SAR depending on the voltage in some liquid.

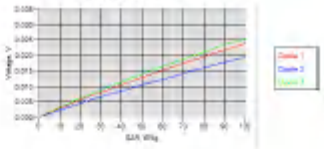
Liquid	Frequency (MHz*)	ConvF
HL750	750	2.37
HL850	835	2.32
HL900	900	2.23
HL1800	1800	2.45
HL1900	1900	2.63
HL2000	2000	2.83
HL2300	2300	2.81
HL2450	2450	2.85
HL2600	2600	2.65
HL3300	3300	2.21
HL3500	3500	2.20
HL3700	3700	2.11
HL3900	3900	2.40
HL4200	4200	2.40
HL4600	4600	2.33
HL4900	4900	2.37
HL5200	5200	2.07
HL5400	5400	2.11
HL5600	5600	2.20
HL5800	5800	2.04

(*) Frequency validity is +/-50MHz below 800MHz, +/-100MHz from 800MHz to 6GHz and +/-200MHz above 6GHz

SAR @ HL750



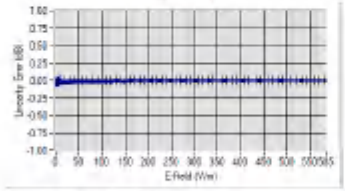
SAR @ HL5800



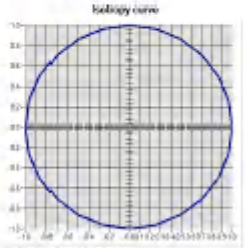
6 VERIFICATION RESULTS

The figures below represent the measured linearity and axial isotropy for this probe. The probe specification is +/-0.2 dB for linearity and +/-0.15 dB for axial isotropy.

Linearity



Linearity: +/-1.42% (+/-0.06dB)



7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
CALIPROBE Test Bench	Version 2	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2026
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2025	07/2028
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	108589	03/2025	03/2028
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2024	06/2027
Power Meter	Keysight U2000A	SN: MY62340002	10/2025	10/208
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Fluoroptic Thermometer	LumaSense Luxtron 812	94264	09/2025	09/2028
Coaxial cell	MVG	SN 32/16 COAXCELL_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG2_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G600_1	Validated. No cal required.	Validated. No cal required.

Waveguide	MVG	SN 32/16 WG4_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G900_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG6_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G500_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG8_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G800B_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G800H_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG10_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_3G500_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG12_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_5G000_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG14_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_7G000_1	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2024	06/2027

SAR Reference Dipole Calibration Report

Ref : ACR.53.29.24.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

BUILDING E, FENDA SCIENCE PARK, SANWEI COMMUNITY, XIXIANG STREET,

BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 2450 MHZ

SERIAL NO.: SN 03/15DIP2G450-352

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 02/21/2024

Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.29.24.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Pedro Ruiz	Measurement Responsible	2/22/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	2/22/2024	
Authorized by:	Yann Toutain	Laboratory Director	2/27/2024	

Yann Toutain ID Signature numérique de Yann Toutain ID Date : 2024.02.27 08:57:39 +01'00'

	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	*Name*	*Date*	*Modifications*
A	Pedro Ruiz	2/22/2024	Initial release

TABLE OF CONTENTS

1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2450 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2450
Serial Number	SN 03/15DIP2G450-352
Product Condition (new / used)	Used

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.

Figure 1 – *MVG COMOSAR Validation Dipole*

4 MEASUREMENT METHOD

4.1 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -20 dB or better. The S11 measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.3 SAR REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore-mentioned standards.

5 MEASUREMENT UNCERTAINTY

5.1 MECHANICAL DIMENSIONS

For the measurement in the range 0-300mm, the estimated expanded uncertainty (k=2) in calibration for the dimension measurement in mm is +/-0.20 mm with respect to measurement conditions.

For the measurement in the range 300-450mm, the estimated expanded uncertainty (k=2) in calibration for the dimension measurement in mm is +/-0.44 mm with respect to measurement conditions.

5.2 S11 PARAMETER

The estimated expanded uncertainty (k=2) in calibration for the S11 parameter in linear is +/-0.08 with respect to measurement conditions.

5.3 SAR

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

The estimated expanded uncertainty (k=2) in calibration for the 1g and 10g SAR measurement in W/kg is +/-19% with respect to measurement conditions.

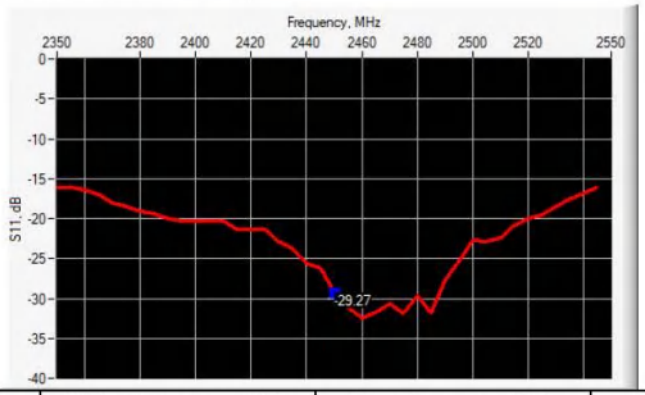
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	**Required**	**Measured**	**Required**	**Measured**	**Required**
-	51.50 +/- 2%	-	30.40 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
2450	-29.27	-20	53.6Ω + 0.1jΩ

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

6.3.1 SAR with Head Liquid

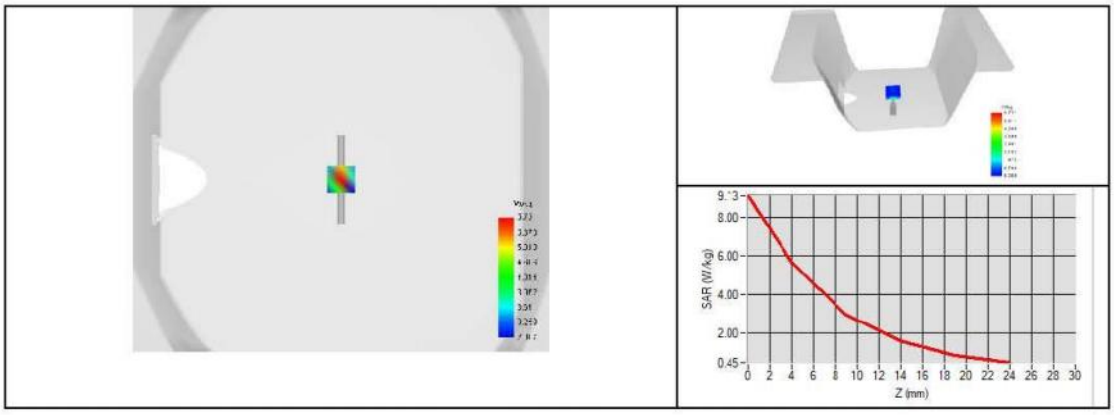
The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.29.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: eps' : 42.1 sigma : 1.83
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=5mm/dy=5mm/dz=5mm
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
2450 MHz	5.00	50.05	52.40	2.38	23.80	24.00



7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

SAR Reference Waveguide Calibration Report

Ref : ACR.53.31.24.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

BUILDING E, FENDA SCIENCE PARK, SANWEI COMMUNITY, XIXIANG STREET,BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA MVG COMOSAR REFERENCE WAVEGUIDE

FREQUENCY: 5000-6000 MHZ

SERIAL NO.: SN 13/14 WGA 33

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 02/21/2024

Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

Summary:

This document presents the method and results from an accredited SAR reference waveguide calibration performed at MVG, using the COMOSAR test bench. The test results covered by accreditation are traceable to the International System of Units (SI).

SAR REFERENCE WAVEGUIDE CALIBRATION REPORT Ref : ACR.53.31.24.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Pedro Ruiz	Measurement Responsible	2/22/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	2/22/2024	
Authorized by:	Yann Toutain	Laboratory Director	2/27/2024	

Yann Toutain ID Signature numérique de Yann Toutain ID Date : 2024.02.27 08:58:45 +01'00'

	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	*Name*	*Date*	*Modifications*
A	Pedro Ruiz	2/22/2024	Initial release

TABLE OF CONTENTS

1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference waveguides used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 5000-6000 MHz REFERENCE WAVEGUIDE
Manufacturer	MVG
Model	SWG5500
Serial Number	SN 13/14 WGA 33
Product Condition (new / used)	Used

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Waveguides are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards.

4 MEASUREMENT METHOD

4.1 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -8 dB or better. The S11 measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.3 SAR REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore-mentioned standards.

5 MEASUREMENT UNCERTAINTY

5.1 MECHANICAL DIMENSIONS

The estimated expanded uncertainty (k=2) in calibration for the dimension measurement in mm is +/- 0.20 mm with respect to measurement conditions.

5.2 S11 PARAMETER

The estimated expanded uncertainty (k=2) in calibration for the S11 parameter in linear is +/-0.08 with respect to measurement conditions.

5.3 SAR

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

The estimated expanded uncertainty (k=2) in calibration for the 1g and 10g SAR measurement in W/kg is +/-19% with respect to measurement conditions.

6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

Frequency (MHz)	L (mm)		W (mm)		Lf (mm)		Wf (mm)	
	Required	Measured	Required	Measured	Required	Measured	Required	Measured
5800	40.39 ± 0.13	-	20.19 ± 0.13	-	81.03 ± 0.13	-	61.98 ± 0.13	-

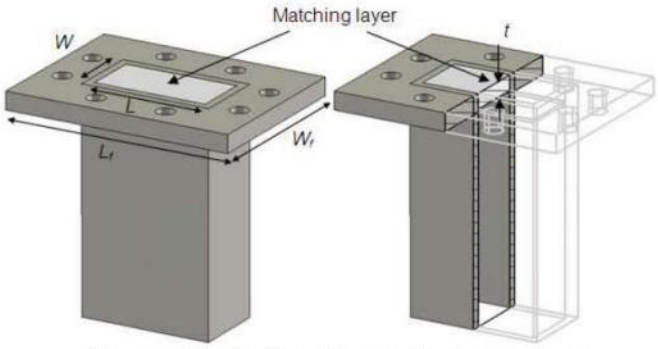
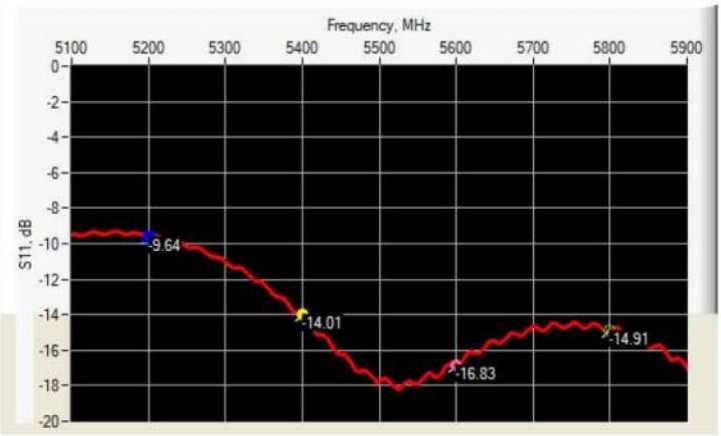


Figure 1: Validation Waveguide Dimensions

6.2 S11 PARAMETER

6.2.1 S11 parameter In Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
5200	-9.64	-8	25.80 Ω - 6.58 jΩ
5400	-14.01	-8	51.53 Ω + 20.60 jΩ
5600	-16.83	-8	44.12 Ω - 12.35 jΩ
5800	-14.91	-8	38.53 Ω + 11.21 jΩ

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference waveguide meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed with the matching layer placed in the open end of the waveguide, with the waveguide and matching layer in direct contact with the phantom shell.

6.3.1 SAR With Head Liquid

At those frequencies, the target SAR value can not be generic. Hereunder is the target SAR value defined by MVG, within the uncertainty for the system validation. All SAR values are normalized to 1 W net power. In bracket, the measured SAR is given with the used input power.

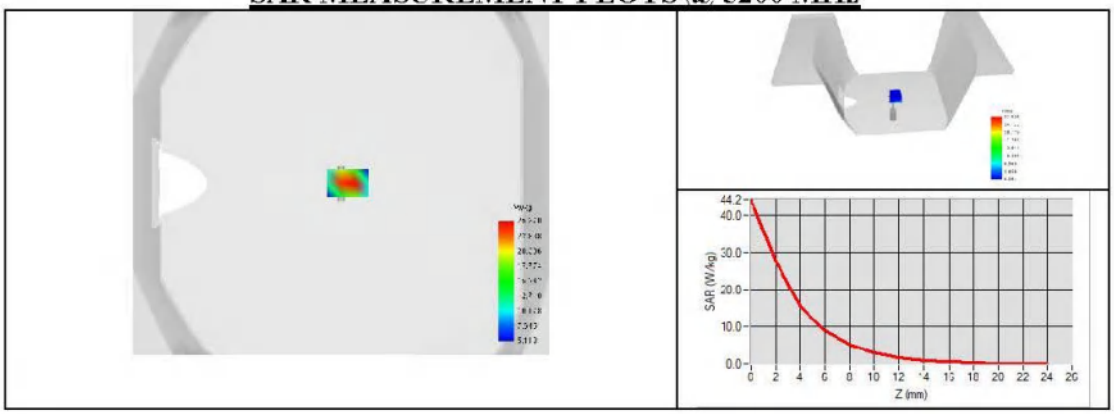
SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref : ACR.53.31.24.BES.A

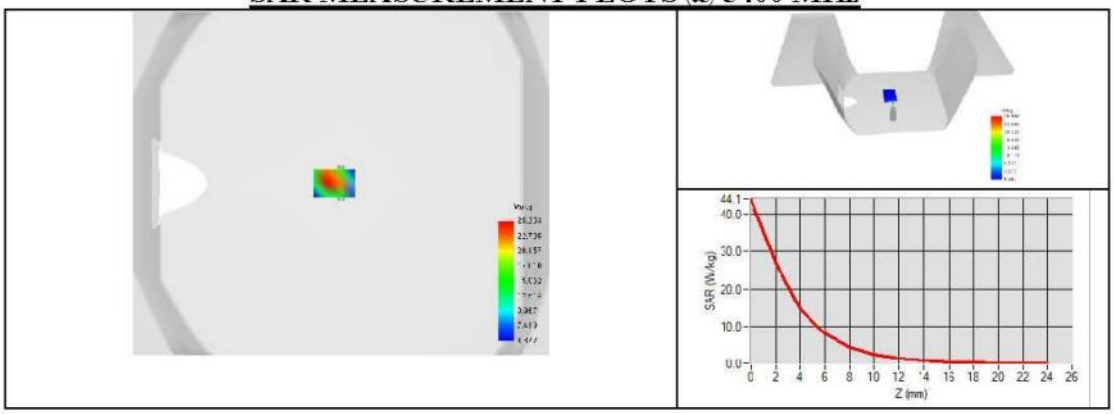
Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values 5200 MHz: eps' :34.16 sigma : 4.42 Head Liquid Values 5400 MHz: eps' :33.63 sigma : 4.64 Head Liquid Values 5600 MHz: eps' :33.12 sigma : 4.87 Head Liquid Values 5800 MHz: eps' :32.57 sigma : 5.12
Distance between dipole waveguide and liquid	0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=4mm/dy=4m/dz=2mm
Frequency	5200 MHz 5400 MHz 5600 MHz 5800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency (MHz)	1 g SAR (W/kg)			10 g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
5200	16.26	162.59	159.00	5.62	56.21	56.90
5400	15.98	159.81	166.40	5.50	55.00	58.43
5600	17.91	179.15	173.80	6.10	61.01	59.97
5800	18.22	182.20	181.20	6.13	61.32	61.50

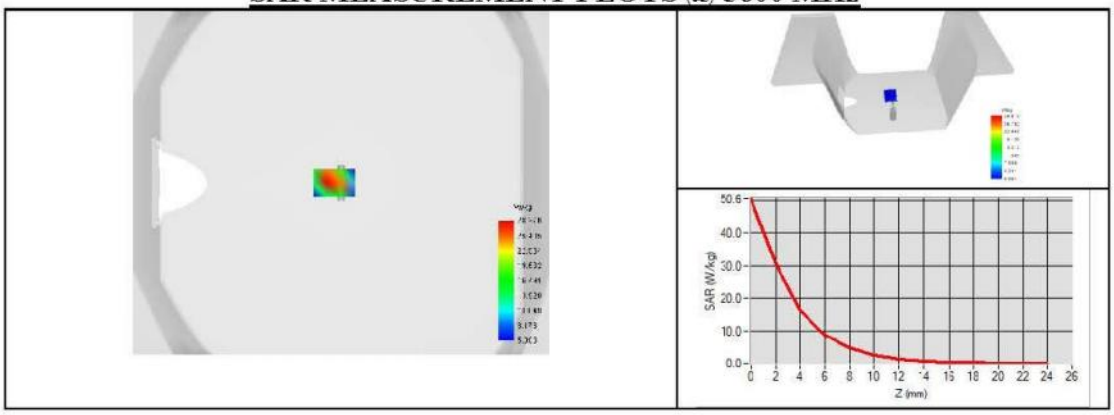
SAR MEASUREMENT PLOTS @ 5200 MHz



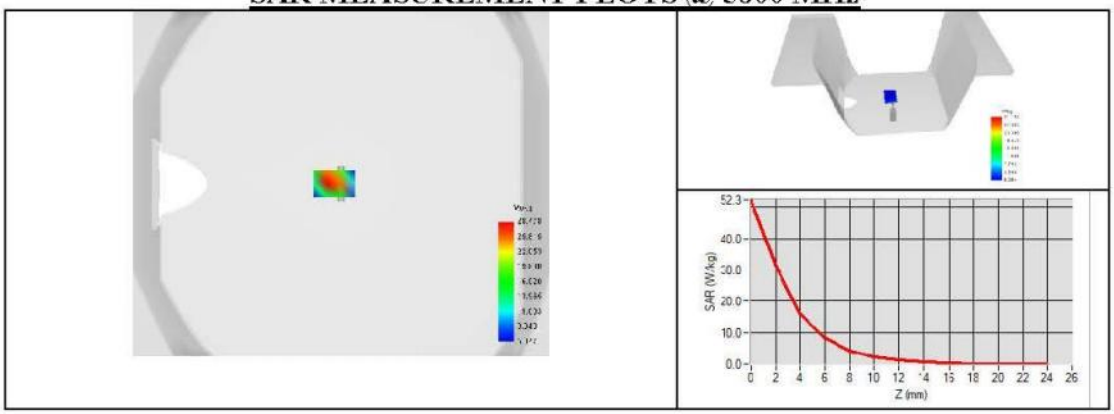
SAR MEASUREMENT PLOTS @ 5400 MHz



SAR MEASUREMENT PLOTS @ 5600 MHz



SAR MEASUREMENT PLOTS @ 5800 MHz



7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3623-EPGO-431	11/2023	11/2024
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

<Justification of the extended calibration>

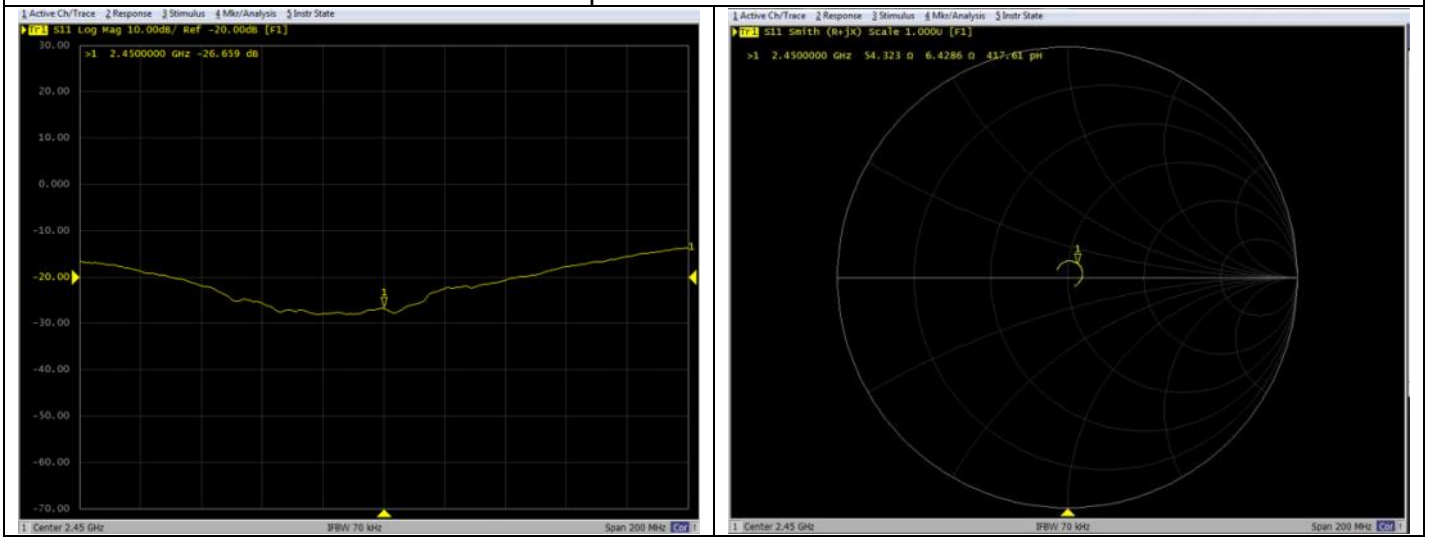
If dipoles are verified in return loss (<-20dB, within 20% of prior calibration for below 3GHz, and <-8dB, within 20% of prior calibration for 5GHz to 6GHz), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

<Head 2450MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-25.738	-	55.969	-	Feb. 13, 2025
-26.659	3.578	54.323	1.646	Feb. 10, 2026

The return loss is <-20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data

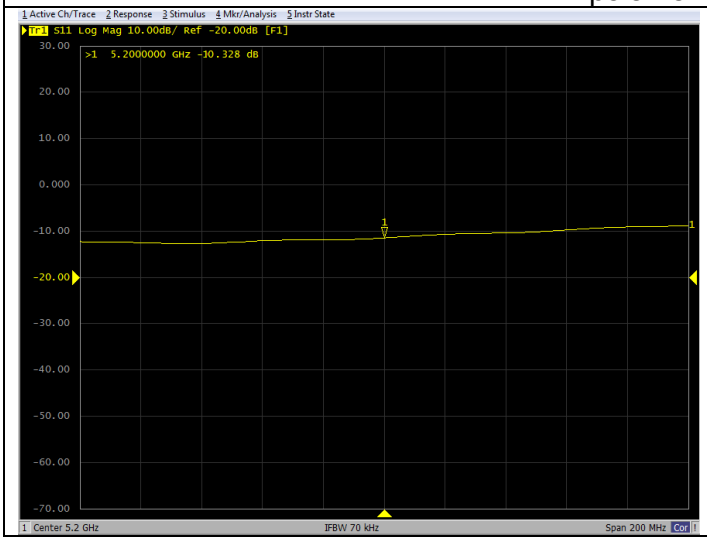


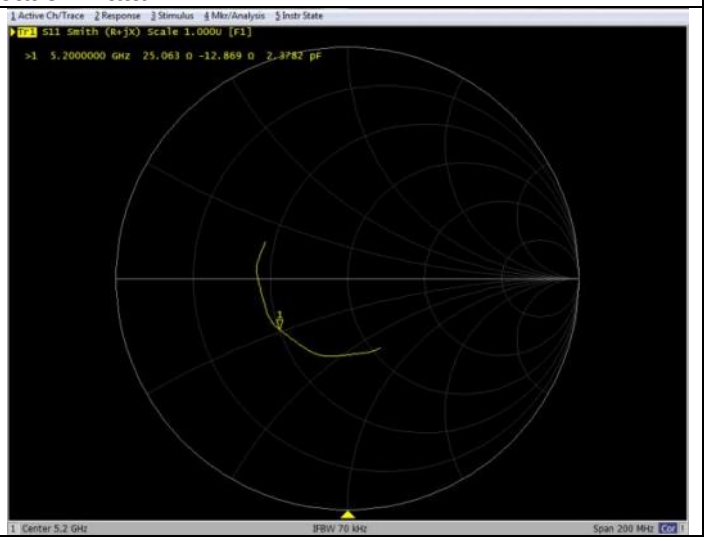
<Head 5200MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-9.494	-	26.574	-	Feb. 13, 2025
-10.328	8.784	25.063	1.511	Feb. 10, 2026

The return loss is <-8dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data



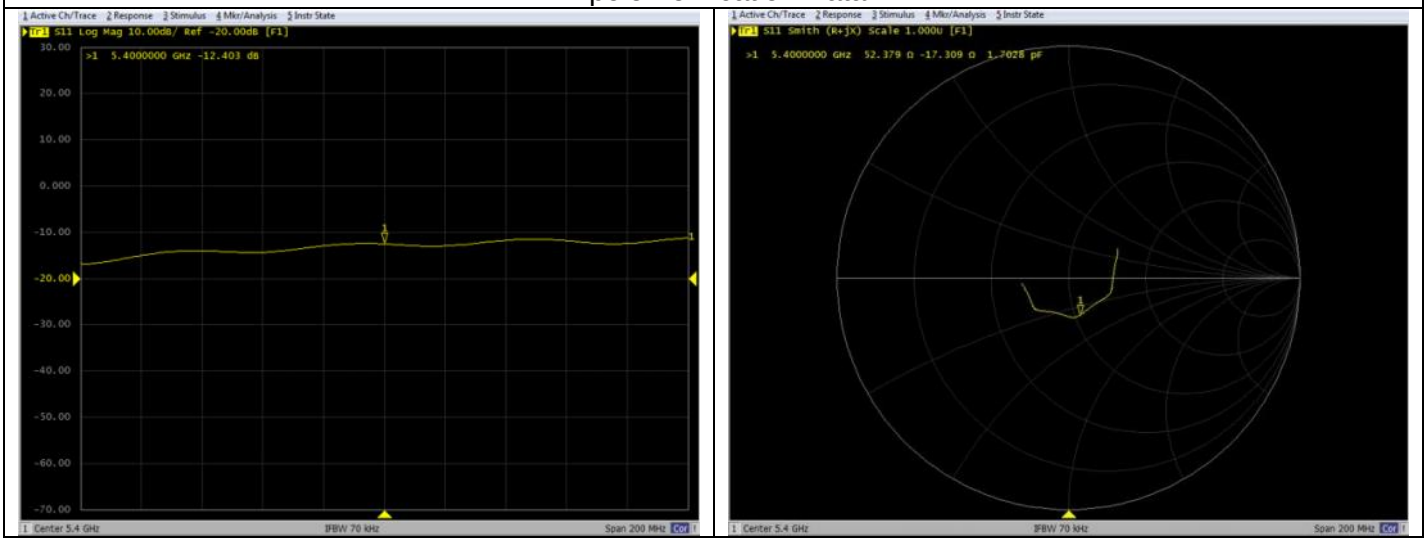


<Head 5400MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-12.971	-	54.166	-	Feb. 13, 2025
-12.403	4.379	52.379	1.7874	Feb. 10, 2026

The return loss is <-8dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data

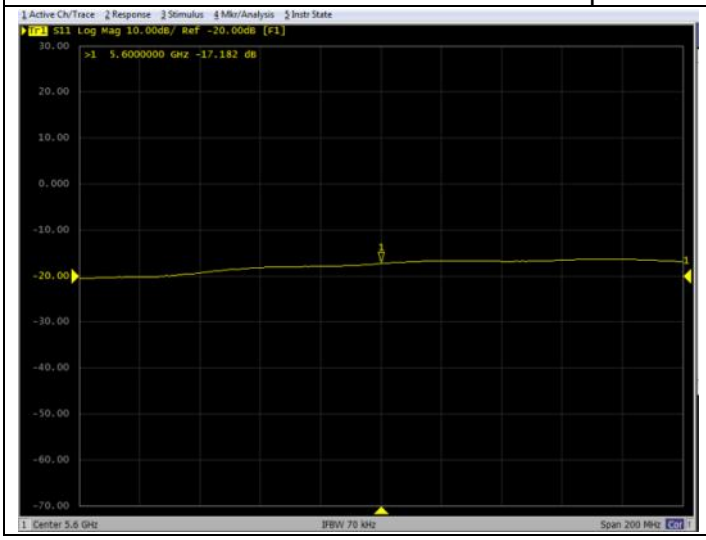


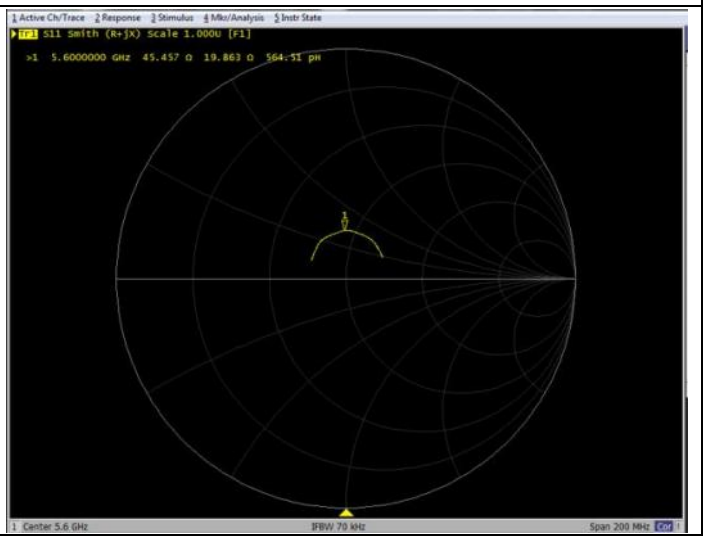
<Head 5600Hz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-16.427	-	46.677	-	Feb. 13, 2025
-17.182	4.596	45.457	1.22	Feb. 10, 2026

The return loss is <-8dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data



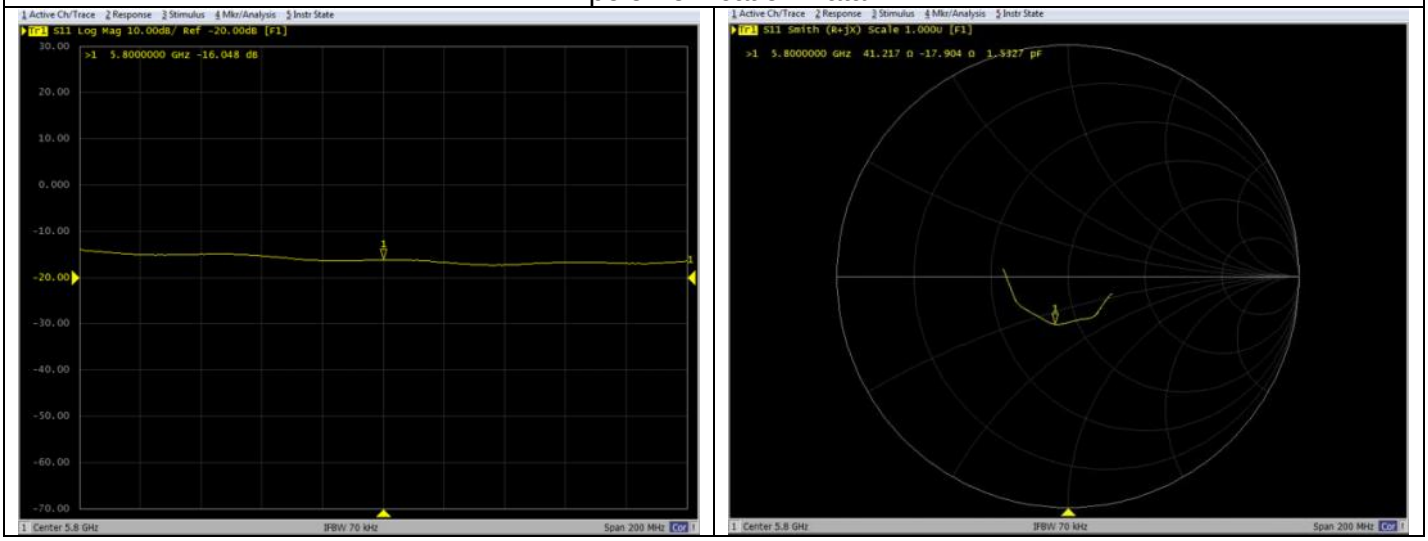


<Head 5800MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-15.039	-	40.791	-	Feb. 13, 2025
-16.048	6.709	41.217	0.426	Feb. 10, 2026

The return loss is <-8dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data



END